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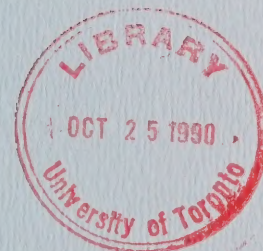
VOLUME: 243

DATE: Thursday, October 11, 1990

BEFORE:

A. KOVEN Chairman

E. MARTEL Member



FOR HEARING UPDATES CALL (TOLL-FREE): 1-800-387-8810

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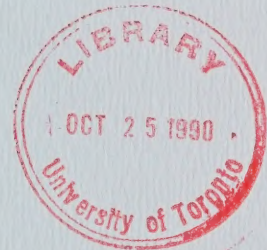
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HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL
RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR
TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental
Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental
Assessment for Timber Management on Crown
Lands in Ontario;

- and -

IN THE MATTER of an Order-in-Council
(O.C. 2449/87) authorizing the
Environmental Assessment Board to
administer a funding program, in
connection with the environmental
assessment hearing with respect to the
Timber Management Class
Environmental Assessment, and to
distribute funds to qualified
participants.

Hearing held at the offices of the Ontario
Transport Board, Britannia Building, 151 Bloor
Street West, 10th Floor, Toronto, Ontario, on
Thursday, October 11th, 1990, commencing at
9:00 a. m.

VOLUME 243

BEFORE:

MRS. ANNE KOVEN
MR. ELIE MARTEL


Chairman
Member

A P P E A R A N C E S

MR. V. FREIDIN, Q.C.)	MINISTRY OF NATURAL
MS. C. BLASTORAH)	RESOURCES
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MR. B. CAMPBELL)	
MS. J. SEABORN)	MINISTRY OF ENVIRONMENT
MS. B. HARVIE)	
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MR. R. COSMAN)	ASSOCIATION and ONTARIO
MS. E. CRONK)	LUMBER MANUFACTURERS'
MR. P.R. CASSIDY)	ASSOCIATION
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MR. G.J. KINLIN		DEPARTMENT OF JUSTICE
MR. S.J. STEPINAC		MINISTRY OF NORTHERN DEVELOPMENT & MINES
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MR. P.D. McCUTCHEON	GEORGE NIXON
MR. C. BRUNETTA	NORTHWESTERN ONTARIO TOURISM ASSOCIATION

I N D E X O F P R O C E E D I N G S

<u>Witness:</u>	<u>Page No.</u>
<u>THOMAS C. HUTCHINSON</u> , Recalled	43637
Cross-Examination by Mr. Cassidy	43637
Cross-Examination by Ms. Seaborn	43771

I N D E X O F E X H I B I T S

<u>Exhibit No.</u>	<u>Description</u>	<u>Page No.</u>
1418	Interrogatory Responses by FFT Panel No. 1 to OFIA Nos. 4 and 6; OFAH Nos. 6, 10, 12 and 17; MNR Nos. 8, 11 and 22.	43634
1419	Nine-page excerpt of document titled: Forest Fire Statistics, 1978-1983, from Canadian Forestry Institute, Environment Canada, authored by Ramsey and Higgins, et al, dated 1981.	43635
1420	Four-page document entitled: Fire Probabilities in Ontario's Boreal Forest, authored by Harrington and Donnelly, dated 1978.	43635
1421	Eight-page document entitled: The Environmental Consequences of Intensive Forestry and the Removal of Whole Trees, authored by Carlisle and Methven, dated 1979.	43636
1422	Four-page document entitled: Clearcutting and the Biogeochemistry of Streamwater in New England, authored by Martin, Noel and Federed, dated November, 1985.	43636
1423	Eleven-page document titled: Red herrings in acid rain research, authored by Havas, Hutchinson and Likens, dated 1984.	43637
1424	MOE Interrogatory Question Nos. 1-6 and response by FFT, Panel No. 1.	43770

Index of Exhibits (Cont'd)

<u>Exhibit No.</u>	<u>Description</u>	<u>Page No.</u>
1425	Four-page document titled: Full-Tree Harvesting Disadvantages from a Forester's Point of View, published in Volume 81, Pulp and Paper Canada, No. 10, October 1980, authored by Ian K. Morrison.	43778

1 ---Upon commencing at 9:05 a.m.

2 MADAM CHAIR: Please be seated.

3 Good morning, Mr. Cassidy.

4 MR. CASSIDY: Good morning, Madam Chair,
5 Mr. Martel.

6 What I thought I would do prior to
7 commencing my questions this morning was to file a
8 group of documents as exhibits assigning individual
9 exhibit numbers to each of them. These are documents
10 that I will be asking or may be asking Dr. Hutchinson
11 various questions about in the course of my
12 cross-examination this morning.

13 I have provided copies to all of the
14 other parties already and I have three copies here to
15 provide to the Board to which we can assign exhibit
16 numbers. (handed)

17 MADAM CHAIR: Thank you.

18 MR. CASSIDY: Madam Chair, if I may be
19 permitted, I will describe the documents and we can
20 then assign an exhibit number to each of them.

21 The first document in the package is a
22 collection of interrogatory responses provided by
23 Forests for Tomorrow in respect of this witness
24 statement and if we could assign the next exhibit
25 number to that I will then describe what those

1 interrogatories are.

2 Would that be Exhibit 14...?

3 MADAM CHAIR: 18.

4 MR. CASSIDY: Thank you. Exhibit 1418
5 consists of interrogatory responses in respect of OFIA
6 Questions 4 and 6, and interrogatory responses in
7 respect of interrogatories filed by the Ontario
8 Federation of Anglers & Hunters; theirs, Nos. 10 and 12
9 and 17, and also interrogatory responses in respect of
10 interrogatories from MNR, and those numbers are MNR No.
11 8, No. 11 and No. 22.

12 All of those interrogatories would make
13 up this Exhibit 1418.

14 MS. SWENARCHUK: OFAH No. 6.

15 MR. CASSIDY: Yes. If I did not mention
16 OFAH No. 6, that is also included in the package, Madam
17 Chair.

18 ---EXHIBIT NO. 1418: Interrogatory Responses by FFT
19 Panel No. 1 to OFIA Nos. 4 and 6;
20 OFAH Nos. 6, 10, 12 and 17; MNR
 Nos. 8, 11 and 22.

21 MR. CASSIDY: And the next exhibit which
22 would, I take it, be Exhibit 1419 is excerpts from
23 Canadian Forest Fire Statistics prepared by various
24 authors, primarily Ramsey and Higgins, and it is a
25 nine-page document.

1 ---EXHIBIT NO. 1419: Nine-page excerpt of document
2 titled: Forest Fire Statistics,
3 1978-1983, from Canadian Forestry
4 Institute, Environment Canada,
 authored by Ramsey and Higgins,
 et al, dated 1981.

5 MR. CASSIDY: And the next exhibit, which
6 would be Exhibit 1420 --

7 MADAM CHAIR: Excuse me. The date on
8 1419 is 1981, Mr. Cassidy?

9 MR. CASSIDY: It runs actually from --
10 the cover page indicates 1981, but it covers years from
11 1978 through to 1983 which will become apparent later
12 on.

13 MADAM CHAIR: There's 1986 on another
14 title page, but that goes to 1983?

15 MR. CASSIDY: As I indicated, yes, 1978
16 through '83 is covered in statistics here.

17 Back to Exhibit 1420 entitled: Fire
18 Probabilities in Ontario's Boreal Forest, the authors
19 are Harrington and Donnelly and it appears to be dated
20 1978 in the upper right-hand corner and it is a
21 four-page document.

22 ---EXHIBIT NO. 1420: Four-page document entitled: Fire
23 Probabilities in Ontario's Boreal
24 Forest, authored by Harrington
 and Donnelly, dated 1978.

25 MR. CASSIDY: Exhibit 1421 is a document

1 entitled: The Environmental Consequences of Intensive
2 Forestry and the Removal of Whole Trees, the authors
3 are Carlisle and Methven and it is dated 1979, and it
4 is eight double sided pages.

5 ---EXHIBIT NO. 1421: Eight-page document entitled: The
6 Environmental Consequences of
7 Intensive Forestry and the
8 Removal of Whole Trees, authored
 by Carlisle and Methven, dated
 1979.

9 MR. CASSIDY: The fifth document in this
10 collection, Madam Chair --

11 MADAM CHAIR: Just one moment, Mr.
12 Cassidy.

13 MR. CASSIDY: Certainly. Yes. The fifth
14 document, Madam Chair, would be Exhibit 1422 and it
15 would be entitled: Clearcutting and the
16 Biogeochemistry of Streamwater in New England, the
17 authors are Martin, Noel and Federer and it is dated
18 November, 1985, four pages.

19 ---EXHIBIT NO. 1422: Four-page document entitled:
20 Clearcutting and the
21 Biogeochemistry of Streamwater in
22 New England, authored by Martin,
 Noel and Federer, dated November,
 1985.

23 MR. CASSIDY: And the last document is
24 titled: Red herrings in acid rain research, the authors
25 are Havas, Dr. Hutchinson here, and Likens and it is

1 dated 1984, 11 pages, and that would be Exhibit 1423 I
2 believe.

3 ---EXHIBIT NO. 1423: Eleven-page document titled:
4 Red herrings in acid rain
5 research, authored by Havas,
 Hutchinson and Likens, dated
 1984.

6 MR. CASSIDY: Thank you, Madam Chair.

7 THOMAS C. HUTCHINSON, Recalled

8 CROSS-EXAMINATION BY MR. CASSIDY:

9 Q. Now, if I may commence, I would like
10 to turn to your CV Dr. Hutchinson which I understand is
11 Exhibit 1407 and I'm interested in asking you some
12 questions in respect of some of the research or studies
13 that you have done, and the first one I'm interested in
14 asking you to explain to me is to be found on page 9 of
15 your CV and it's Item No. 8.

16 MR. MARTEL: Is that page 8, Mr. Cassidy?

17 MR. CASSIDY: It's listed as page 9 in my
18 copy, Mr. Martel, and it's Item No. 8.

19 Q. And, Dr. Hutchinson, the title of
20 that research award, it's an insert: Strategic
21 Toxicology and the Development of Acid, Metal and
22 Sulfur Dioxide Tolerant Variety for Revegetation
23 Purposes in Development of a Unifying Body of Theory
24 for Metal Tolerance.

25 Can you explain to me in more detail what

1 that study or what that research involved?

2 A. Well, this concerned three groups of
3 organisms, three sort of classes of organisms; one was
4 higher plants, grasses and particular species of grass
5 which are grown in the Sudbury area and around Cobalt
6 and on the Bruce Peninsula, and it also involved
7 looking at some algae, basically phytoplankton from an
8 area in the Arctic which is extremely acidified which
9 we call the Smoking Hills, and also looking at Sudbury
10 soil algae and bacteria from the Sudbury soils.

11 And the interest was that each of these
12 organisms, each of these groups of organisms had
13 developed extreme levels of tolerance.

14 Q. And that is tolerance to metals?

15 A. That's tolerance to the presence of
16 normally toxic concentrations of metals in the
17 environment.

18 In the case of the grasses they are also
19 astonishingly tolerant to high levels of sulfur
20 dioxide, and since these are -- well, we're dealing
21 with bacteria, algae and higher plants. The interest
22 was, was it possible that there was some common
23 mechanisms which had evolved as a result of exposure to
24 these environments.

25 Q. When you say 'exposure to these

1 environments', can you assist me: Is that in respect
2 of metals being transmitted into the sites where these
3 organisms were found through precipitation of some
4 sort, or is that through ground transmission, or what
5 was that?

6 A. Well, the Sudbury situation is, of
7 course, there's a certain amount of nickel and copper
8 in some of the bedrocks there, but the principal
9 mechanism of input into those ecosystems was from the
10 air, aerial contamination from the dust from the
11 smelters. And in the case of the Smoking Hills, and
12 that would be the same for Cobalt.

13 Q. Okay. Forgive me, is Smoking Hills a
14 particular place?

15 A. Yes, it's an area in the western
16 Arctic.

17 Q. Thank you. Go ahead.

18 A. It's very acidified. And there it's
19 historical, very ancient burns of sulfur dioxide --
20 well, emissions of sulfur dioxide from poor quality
21 coal deposits in the sea cliffs and they probably
22 burned for a thousand years.

23 Q. All right. If I can then move to
24 Item No. 17 on that page, Dr. Hutchinson, it's
25 titled -- it's another insert research award or

1 strategic grant, No. 17. Do you see that?

2 A. Yes.

3 Q. And it's titled: The Effect of Leaf
4 Surface Chemistry and Anatomy on Acid Rain Damage.
5 Could you expand on what that is similar to what you
6 have just done with respect to Item No. 8?

7 A. Okay. Well, here we were interested
8 in, from some observations that I had made at the
9 Smoking Hills, that one of the most sulfur dioxide
10 tolerant plants of the Smoking Hills seemed to have
11 remarkable capacity in its leaves to neutralize acidic
12 droplets falling through the plumes there.

13 We wanted to know if this phenomenon of
14 leaf surface neutralizer was a common one. So we came
15 to areas where acidic deposition was, if you like, a
16 genuine problem and we looked at quite a large number
17 of plant species, boreal forest species and crop plants
18 to see if -- first of all, if they differed in their
19 ability to neutralize acidic droplets; and, secondly,
20 whether that related to the overall tolerance of these
21 plants to acid precipitation.

22 Q. I see.

23 A. We tried to look at the mechanism.

24 Q. So that was dealing with acidic
25 droplets which, in my layman's terms, is some sort of

1 precipitation; is that correct?

2 A. Yes.

3 Q. All right. And that would be acid
4 precipitation; right? Yes or no?

5 A. Yes.

6 Q. Thank you.

7 A. Sorry.

8 Q. That's fine. If we could then move
9 to the section on page 10 of your CV dealing with
10 scholarly and professional work, and the very first
11 item there: Adams, Capehorn and Hutchinson, this is a
12 list of your publications, and it's titled: The
13 Disruption of Waxes and Appearance of Crystals in the
14 Leaf Surface of Cabbage Treated with Simulated Acid
15 Rain.

16 Now, this appears to be in press. Can
17 you expand on what the general theme of that work is as
18 well, just briefly?

19 A. Yes. That paper is published now.

20 Q. Congratulations.

21 A. Well, it turned out that part of the
22 hypothesis was correct or seemed to be at least
23 sustainable that leaf surfaces did differ substantially
24 in their ability to neutralize acid droplets. We then
25 wanted to know: Was there a relationship between the

1 ability of root systems to pick up bases such as
2 calcium and deliver these to the leaf surface, you
3 know, was there somewhere that they were particularly
4 adept at doing that and they could deliver it onto the
5 leaf surface.

6 It then turned out that the wetability of
7 leaf surfaces, the ability of the droplets, if you
8 like, to percolate through the - which is an unusual
9 phenomenon, but there are micropores in the leaf
10 surfaces - we wanted to know, or we found out that the
11 waxiness of leaf surfaces in fact mitigated against
12 contacting these neutralizing substances.

13 So this is a study in cabbage, which I'm
14 sure everyone would be delighted to know is remarkably
15 tolerant to acid rain, it was study of the solubility
16 of the waxes of cabbage leaves.

17 Q. All right. Would that relate again
18 to a form of acid precipitation that spurred your
19 interest in doing that type of work?

20 A. Yes, that did.

21 Q. If we go back then to your page 7 of
22 your resume, Dr. Hutchinson, you've indicated that --
23 and I'm looking at Item B under Research Endeavors
24 where you list your general areas of interest and, in
25 fact, you list a number of areas of interest all the

1 way down to Item O on page 8, but I'm interested in
2 Item No. B, The Effects of Acid Precipitation on
3 Ecosystems.

4 And would it be fair to say that the
5 studies that I have just referred you to and which you
6 have explained in greater detail are examples of the
7 interest that you have indicated there under Item B,
8 The Effects of Acid Precipitation on Ecosystems?

9 A. Yes, that would be accurate.

10 Q. And in fact would you agree that
11 without going into much more detail of your resume that
12 it's fair to say that that is a primary interest of
13 your research endeavours?

14 A. It's one of them, yes.

15 Q. I understand that it's one of them,
16 sir, but I'm interested if in fact you would consider
17 it one of the more important or primary ones of your
18 interest?

19 A. Well, probably in terms of in the
20 last five, six years my primary interest has been in
21 forest decline. Now, there's a possible relationship
22 to acid precipitation, so that's still a background
23 interest and I'm certainly doing some research on acid
24 precipitation still.

25 Q. I see.

1 A. But I don't think it would be totally
2 accurate to say it's my -- the primary interest, it's
3 one of my primary interests.

4 Q. All right. So you have a number of
5 primary interests and it's one of them; is that fair to
6 say?

7 A. Right.

8 Q. All right.

9 A. I don't know if you can have a number
10 of primary interests, but I have a number of interests.

11 Q. Some are more primary than others,
12 eh?

13 A. Yes.

14 Q. All right. Well, as I understand it
15 then, in respect of your interest in acid precipitation
16 you continue to work in that field and, in fact, you've
17 just published a book which you've informed us is now
18 just published since 1989; is that correct?

19 A. Yes.

20 Q. The Adams book?

21 A. That's a paper, it's not a book.

22 Q. I'm sorry, a book. And is it fair to
23 say that your work in that area does not involve the
24 study of the impacts of timber management when you're
25 dealing with work in that area?

1 A. Timber management. Well, the acid
2 rain work includes a ten-year study of the impacts on
3 the boreal forest.

4 Q. Of acid rain?

5 A. Yes.

6 Q. All right. You're aware that acid
7 rain is not one of the timber management activities we
8 have dealt with in this hearing? Do you know what
9 those are, Dr. Hutchinson?

10 A. No, I don't want -- I don't tend to
11 follow all of the hearings.

12 Q. All right.

13 A. But I think I have an idea what
14 timber management means.

15 Q. And is it fair to say then that your
16 work on forest decline is primarily in the field of
17 acid precipitation and it's effect on potential forest
18 decline?

19 A. Well, it's an attempt to find out
20 what the mechanism of forest decline is.

21 Q. Right.

22 A. Acid precipitation is one of the
23 things we're considering.

24 Q. All right.

25 A. But the focus is principally on soil

1 nutrition which seems to be a key, in our opinion, as
2 to what's going on.

3 Q. I see. And you're looking at it from
4 the perspective of impacts of acid precipitation, among
5 other things?

6 A. Well, if it turns out that acid
7 precipitation is a factor. It's one of several things
8 we're looking at. It focuses on the soils. You have
9 to leave acid precipitation. You see, my concern here
10 is that the press monotonously assumes that acid rain
11 causes almost everything.

12 Q. Yes. I didn't look at the press, Dr.
13 Hutchinson, I looked at your resume.

14 A. Okay.

15 Q. Sorry, go ahead.

16 A. You're jumping a little bit from my
17 interest in forest decline to link it directly with
18 acid rain.

19 Q. I see.

20 A. I'm suggesting there may be a link
21 but it's not proven.

22 Q. All right. And would it be fair to
23 say that another one of your interests is the influence
24 of metals and metal tolerance from animals -- I'm
25 sorry, metal tolerance in plants.

1 A. Yes, yes.

2 Q. All right. Now, in respect of your
3 witness statement, I would like to turn you to page 8
4 of Panel 1 which is Exhibit 1405A. Do you have that?

5 A. Yes.

6 Q. And I would like to refer you to the
7 very middle of that page. You have referred to - and
8 correct me if I state this wrongly, Dr. Hutchinson -
9 but you've referred to the Freedman Morash and Hanson
10 paper of 1981 in the preceding paragraphs, but in the
11 middle of the page where you seen the words 'my own
12 conclusion', do you see that?

13 A. Yes.

14 Q. You go on to state that:

15 "My own conclusion from the same data
16 base..."

17 Is that the data base you're referring
18 to, is the Freedman database --

19 A. Yes.

20 Q. Contained in their paper? Yes or no?

21 A. Yes.

22 Q. Thank you. Your conclusion is that
23 tree growth could reasonably be expected to decline
24 precipitously in a second generation and that the site
25 may for the foreseeable future be unable to develop a

1 useful cuttable crop.

2 Now, with respect to that you were asked
3 in an interrogatory by the Anglers & Hunters, which I'm
4 not filing because I think it's straightforward, you
5 were asked the question in respect of the data base and
6 the -- if you'll bear with me I'll just read it to you.

7 You were asked: In quantitative terms -
8 this is by the Anglers & Hunters - what level of
9 decline in forest growth is forecast for the various
10 sites examined by Freedman. And you answered that they
11 do not give quantitative estimates of growth rate
12 declines. Do you recall that?

13 A. Yes.

14 Q. All right. And you have indicated,
15 in addition to drawing your own conclusion there in
16 your executive summary in paragraph 3, and you can find
17 that on little Roman numeral (i) of Panel 1.

18 A. Sorry, excuse me.

19 Q. In your executive summary.

20 A. Right.

21 Q. Paragraph 3 you state that:

22 "Full-tree harvesting on moderate to poor
23 nutritional sites will inevitably cause
24 restrictions to the ability of such sites
25 to successfully grow second and further

1 generation forests in the absence of
2 appropriate fertilizer applications."

3 And then the page reference would include
4 the Freedman and Morash discussion you have on page 8?

5 A. Right.

6 Q. And can you confirm for me that you
7 have not done any studies yourself on second generation
8 tree growth and site productivity after full-tree
9 harvesting?

10 A. Right.

11 Q. And as a scientist then, Dr.
12 Hutchinson, are you prepared to suggest something is
13 inevitable when you haven't studied it and the
14 scientists whom you have referred to haven't studied it
15 either?

16 A. And a scientist or the scientist?

17 Q. Well, are there other studies to
18 which you've referred to in drawing that conclusion on
19 page 8?

20 A. Well, this includes studies from, it
21 says from pages 4 to 21.

22 Q. I'm sorry, sir. When you refer to
23 page 8 you will note that you draw the conclusion from
24 that Freedman Morash and Hanson data base. Are you
25 saying that your conclusion in your executive summary

1 with respect to inevitability refers to other studies
2 than the Freedman, Morash and Hanson study?

3 A. Well, the Freedman study was one in
4 which the general direction of the data seemed to be in
5 line with the other studies that I examined.

6 Q. I see.

7 A. But their conclusions are somewhat
8 different.

9 Q. Did any of those other studies study
10 that you looked at, the second generation tree growth
11 and site productivity after full-tree harvesting? Are
12 there any studies of that nature?

13 A. I'm sorry, I'm not trying to be
14 difficult. Do you mean, did anybody actually look
15 right through a second generation and see what
16 happened?

17 Q. Correct, yes.

18 A. I don't think so.

19 Q. No. So there no studies by which you
20 could draw an inevitable conclusion; is that correct?

21 A. There are no studies, that's right.
22 That's my opinion.

23 Q. Thank you. So it's your opinion?

24 A. Yes.

25 Q. And as I indicated, are you prepared

1 to suggest something is inevitable when there are no
2 studies?

3 A. Well, given certain facts I would be
4 prepared to, yes.

5 Q. I see. And if the facts are not
6 supported by a study, you are prepared to make that
7 opinion; are you?

8 A. If the facts are not supported by a
9 study. But I felt that Freedman's -- the paper that
10 you quoted here on page 8, the actual data and some of
11 their comments in it indicated that calcium in the next
12 generation would be insufficient, and since calcium is
13 a major nutrient essential for growth, and given that,
14 at least within the normal generation time, you're
15 unlikely to be able to develop the same timber crop
16 that you had that first time.

17 Q. So it's unlikely; those are your
18 words?

19 A. It's unlikely, yes.

20 Q. I see. That's not inevitable; is it?

21 A. No, that's a different strength of
22 emphasis, there's no question.

23 Q. Thank you very much. Now, I would
24 like to -- in line with this, I would like to turn you
25 to something you said last Tuesday, and that's October

1 2nd and I'm quoting you.

2 This is in response to a question from
3 Ms. Swenarchuk where she asked you the following
4 question:

5 "Do you anticipate that air pollution
6 will have an impact on the Ontario Great
7 Lakes/St. Lawrence wood supply in the
8 future?"

9 And your answer was - and again I'm
10 quoting you:

11 "I don't like to talk in terms of wood
12 supply."

13 Why is that, Dr. Hutchinson?

14 A. Why don't I like to -- well, that's
15 in the context of air pollution.

16 Q. Well, all right. So you're prepared
17 to talk about wood supply in other contexts?

18 A. Well, I'm prepared to talk about
19 probabilities in terms of being able to regenerate
20 successfully to the same rates of growth and so on,
21 yes.

22 Q. But in terms of wood supply, the
23 supply that's needed in the future for the forest
24 products industry, you're not prepared to talk about
25 that; are you? Are you an expert in that?

1 A. No, I'm not an expert in that.

2 Q. So anything you could offer --

3 A. There are certain ecological
4 principles which would obtain irrespective of presence
5 of wood supply. One is the law of limiting factors.

6 Q. Right. And one is the law of demand
7 and supply for the future in respect of the products
8 that are need; is that correct?

9 A. Absolutely.

10 Q. And you wouldn't have any expertise
11 in that; would you?

12 A. No.

13 Q. So is that perhaps why you're not
14 prepared to talk in terms of wood supply?

15 A. No, I think the situation with the
16 boreal forest with respect to air pollution is really
17 not clear. We know that certain species are sensitive
18 but there hasn't been enough monitoring done in the
19 boreal to know whether we're already into a downturn in
20 turns of air pollution.

21 Q. So to summarize then, you're just not
22 prepared to make any predictions on wood supply just
23 because of that uncertainty; is that correct?

24 A. Yes.

25 Q. Thank you. I take it then you've not

1 done any analysis of wood supply as a result of your
2 view that tree growth in second generations may
3 decline?

4 A. That's correct.

5 Q. So you're not able to assist the
6 Board in that respect?

7 A. No. If they wished assistance, I
8 couldn't assist them in that respect.

9 Q. All right. It would just be
10 speculation I guess; wouldn't it?

11 A. It would depend on the questions, but
12 yes, in general terms it would be.

13 Q. All right, thank you. I want to move
14 on to the issue of something you said to Mr. Hanna last
15 day which got me interested, and I'm going to again
16 quote you.

17 And if you'll pardon me for reading
18 through the question again, but the question and answer
19 need to be read together. The question was:

20 "What forecasting tool are you suggesting
21 should be used to predict the ecological
22 impact of acid rain on timber growth in
23 the forest ecosystem as part of the
24 timber management planning process of
25 this province?"

1 Your answer was:
2 "Right. Well, clearcutting most
3 especially full-tree harvesting, leads to
4 acidification. The necessity to protect
5 watersheds is quite an important issue
6 Aside from increasing the probability of
7 future poor growth it's likely to lead to
8 water degradation and lake acidification
9 and so on."

10 Now, that got me interested, Dr.
11 Hutchinson, because I became familiar with a document
12 that you wrote which seemed to me to suggest exactly
13 the opposite. And that is Exhibit 1423, Madam Chair,
14 the document titled: Red herrings in acid rain
15 research.

16 And I understand that you and Magda Havas
17 and Gene Likens were the author of that, and as I
18 understand it, this was dealing with - and I'm quoting
19 from the title - common misconceptions regarding the
20 effects of acid deposition on aquatic ecosystems.

21 And if I can refer you to the second page
22 of this document, it actually has a No. 3 up in the
23 upper right-hand corner, but it is the second page, and
24 the first paragraph on that -- first full paragraph on
25 that page states:

1 "We have selected five common
2 misconceptions, red herrings, regarding
3 the effects of acid deposition on aquatic
4 ecosystems in an attempt to clarify some
5 of the confusion they have created.
6 These misconceptions are the
7 following:..."

8 And I'm interested in the third one where
9 you state:

10 "Acidification of lakes and streams
11 results from changed land use practices
12 (forestry, agricultural, animal
13 husbandry) and not acid deposition."

14 And then you go on to discuss that red
15 herring at what is numbered in the upper right-hand
16 corner page No. 6 - it's probably page No. 5 - but it's
17 numbered page No. 6 in the upper right-hand corner
18 titled: Red herring number three.

19 And you go on to state there, again you
20 reiterate the red herring, that it results from changed
21 land use practices (forestry,...), et cetera and then
22 you state:

23 "While it is true --

24 MS. SWENARCHUK: Where is this?

25 MR. CASSIDY: Do you have that, Madam

1 Chair?

2 MADAM CHAIR: No, I'm on page 4, but you
3 are on page 5, 6.

4 MR. CASSIDY: It has a No. 6 up in the
5 upper right-hand corner.

6 MADAM CHAIR: No. 6, yes.

7 MR. CASSIDY: And you will see the
8 paragraph titled: Red herring number three, and it
9 reiterates the red herring which you just indicated at
10 the start of the article and you state that:

11 "While it is true that disturbances
12 within the drainage basins of lakes and
13 streams can have a profound effect on
14 water quality...", and then you refer to
15 the Likens study which I think you've referred to in
16 your paper here,

17 "...it is misleading to suggest that the
18 regional acidification observed in
19 Scandinavia and eastern North America is
20 due predominantly to changes in land use
21 practices and not to atmospheric pollutants."

22 And then you go into a discussion of your
23 reasons for that, and at the bottom of the next
24 paragraph -- do you have that, Madam Chair, where the
25 second sentence from the bottom of that next paragraph

1 states:

2 "Many of the lakes --", I'm sorry, "Many
3 of the Ontario lakes..."

4 MADAM CHAIR: Yes, it's highlighted in
5 yellow.

6 MR. CASSIDY: Thank you. "Studied by
7 Dillon are also in unlogged basins. This
8 eliminates changes in forestry practises
9 as a possible cause of acidification."

10 You then continue your discussion on this
11 and you refer in the next column of this page to the
12 Drablos and Sevaldrud study and you indicate that they
13 examined - and that's at the very last paragraph on
14 page 6 - that they examined poorly buffered lakes in
15 southern Norway for which there are good historical
16 data on fish and land use. They found...", that's
17 Drablos and Sevaldrud,

18 "...found that since 1965 the pH
19 decreased from 5.5 to 5.0 and that within
20 the last decade severe damage to fish
21 populations was reported in many mountain
22 lakes. They eliminated changes in
23 forestry and drainage to possible
24 sources...", and I'm on to the next page
25 now, the very top,

1 "...of this increased acidity in four of
2 the five areas studies because most of
3 the affected lakes are above the tree
4 line."

5 If I can then take you down to --

6 A. I'm sorry to stop you.

7 Q. Well, just let me finish and then you
8 can go back, unless you're not following along.

9 A. It's just that last one, I wasn't
10 able -- I didn't catch where it was.

11 Q. I'm sorry, it's the very top of page
12 7.

13 A. Okay.

14 Q. Then if we stay on page 7 and we go
15 down to the next full paragraph which starts with:

16 "Schindler and Ruszczynski found similar
17 results for lakes in the experimental
18 lakes area in western Ontario between
19 1973 and 1978. This area is not exposed
20 to acid rain. During the five-year
21 period pH increased in many of the lakes
22 that had some disturbances within their
23 drainage basins (i.e., a major wind
24 storm, fire, or clearcut logging), but
25 remained constant in undisturbed lakes."

1 Then you go on in the next paragraph to
2 discuss that:

3 "In the White Mountains of New Hampshire
4 forest clearing resulted in a temporary
5 increase in streamwater acidity that
6 lasted for two years. The drainage water
7 then became...", and then you have
8 highlighted,

9 "...less acidic than it was prior to the
10 deforestation."

11 And you're referring to a Likens article
12 in press which I believe is at Tab 19 of your source
13 book.

14 Similarly then we get into a discussion
15 on burning in New Jersey. But if we go then down to
16 the last paragraph, the penultimate paragraph of this
17 article, it states:

18 "Although changes in land use cannot be
19 eliminated entirely as a mechanism for
20 surface water acidification they cannot
21 explain convincingly the wide-spread
22 regional acidification of lakes and
23 streams in parts of Scandinavia and
24 eastern North America exposed to acid
25 deposition. On a regional scale the

1 Correlation between areas receiving an
2 acid rain and those with acid lakes
3 is so strong that land use...", one of
4 which you've defined as forestry,
5 "...does not seem to matter."

6 Now, in light of the evidence you gave on
7 Tuesday in respect of lake acidification being caused
8 by clearcutting, how can you explain the difference in
9 these two articles and evidence that you've written?

10 A. Well, I don't think I say that there
11 is great discrepancy that you want me to see, I think
12 you see here.

13 The point of this red herrings article is
14 that we have regional acidification going on in
15 Scandinavia, northern Britain and in a good slice of
16 eastern North America and there's coincidence between
17 that lake acidification and increased precipitation
18 acidity.

19 There are also areas in which some lake
20 acidification has taken place which has been ascribed
21 to land use practices and there are several pages which
22 I presumably refer to in that article about that.

23 Land use practices can cause local
24 acidification of lake systems but the overall -- but
25 when we confine lake acidification taking place where

1 there's been no cutting or no changes in land use
2 practices, then you can't ascribe that to those land
3 use practices, you can't ascribe that acidification,
4 and if we find there's a coincidence in those areas
5 between increased acid deposition, especially sulfur
6 inputs, then you have to seek other than the land use
7 sources for it.

8 Q. All right. So you're saying that on
9 the regional scale a land use practice such as
10 clearcutting does not cause lake acidification; is that
11 what you're saying?

12 No, just a second, hear me out.

13 A. On a regional scale.

14 Q. Hear me out, Dr. Hutchinson. Are you
15 saying that it does not cause lake acidification on a
16 regional scale in your red hearings article?

17 A. Yes.

18 Q. All right. And is that your evidence
19 here today?

20 A. Well, we're looking on smaller scales
21 here today I think.

22 Q. Well, what I'm asking you is, do you
23 still feel that view today?

24 A. I certainly think that the overriding
25 cause of lake acidification in Scandinavia and eastern

1 North America has been increases in acid deposition,
2 yes.

3 Q. Right. And do you still hold the
4 view that land use practices on a regional scale do
5 not, in a your words in the article, seem to matter?

6 A. I don't like the words seem to
7 matter. I'm sorry we put that in.

8 Q. So that -- I see. Slipped through
9 the press; did it, Dr. Hutchinson?

10 A. The general tenure I certainly feel
11 is still the same, I still feel that.

12 Q. I see. So there are --

13 MADAM CHAIR: Excuse me, Dr. Hutchinson.
14 Has any work been done on the contributions of either
15 land use causes on one lake acidification versus the
16 regional source of acid rain?

17 THE WITNESS: Yes, there have been
18 studies of that kind.

19 MADAM CHAIR: And so you're able to
20 separate out what the contribution is--

21 THE WITNESS: Yes, you can.

22 MADAM CHAIR: --by some land use--

23 THE WITNESS: Right.

24 MADAM CHAIR: --activity versus the
25 transportation of acid rain?

1 THE WITNESS: Yes, yes.

2 MADAM CHAIR: Do we have any of that
3 evidence before us?

4 THE WITNESS: Well, I think the examples
5 that come from the experimental lakes region where you
6 have some of the -- some of Schindler's work, Barry
7 Nicolson's work was in that direction. That didn't
8 relate to acid precipitation.

9 MADAM CHAIR: Is there any --

10 THE WITNESS: Some of the work from
11 Galloway and Wright, they looked at things the other
12 way, they went above the tree line or they went to
13 areas where there is no longer any trees in Scotland
14 and found that lake acidification was taking place in
15 those upland and Alpine lake systems and, therefore, it
16 could not relate to tree growth or forest practices.

17 So those were sort of overriding the
18 potential that tree growth has been soil acidification.

19 MR. CASSIDY: Q. Dr. Hutchinson, to be
20 fair to you, you're aware that you wrote in this paper
21 that Schindler's work in the experimental lakes area
22 supported your premise at the time that land use
23 practices do not seem to matter. You specifically
24 refer to that study on page 7.

25 A. Right, yes.

1 Q. All right. Now, are you suggesting
2 something different here today to Madam Chair, that
3 that work suggests the opposite now?

4 A. No, no, I'm not suggesting that. I'm
5 suggesting that was a study in which--

6 Q. I see.

7 A. --there was no acid precipitation as
8 a factor.

9 Q. All right. So you were providing
10 Madam Chair with a answer of a study where there was a
11 specific area studied?

12 A. Yes.

13 Q. And the answer, or the results of
14 that study supported your view in 1984 that clearcut
15 logging did not have an impact on lake acidification?

16 A. Well --

17 Q. You wrote it, I didn't.

18 A. Okay. Do you mind if I just read
19 what was written with respect to the Schindler article
20 there.

21 Q. Take all the time in the world.

22 A. Okay. So what I'm -- this is on page
23 7 of this article - 7 in the right-hand corner - and at
24 the bottom of the first column we say that:

25 "Schindler and Ruczczyński found similar

1 results for...Experimental Lakes areas
2 between '73 and '78. This area is not
3 exposed to acid rain."

4 Well, we're inconsistent on that, I don't
5 think it still is.

6 "During the five-year period, pH
7 increased in many of the lakes that had
8 some disturbances within their drainage
9 basins (i.e., major wind storm and fire
10 or clearcut logging), but would remain
11 constant in undisturbed lakes."

12 Yes.

13 Q. Can I just clarify one thing, when pH
14 increases that means acidity decreases in the lake;
15 right?

16 A. Yes.

17 Q. So is it fair -- well, continue.

18 A. Well, they have some lakes in that
19 area - and I would have to go back to the original
20 paper I'm afraid to dig out how many lakes they looked
21 at - they had some lakes in that area in which the pH
22 went up, that is the acidity decreased.

23 Q. That was in lakes where there was
24 clearcutting disturbances as you've indicated?

25 A. Perhaps implied there, yes, that's

1 certainly the case.

2 Q. I'm not asking you to interpret
3 someone else's work here, I'm asking you to interpret
4 your own.

5 A. No, no. I'm just reading what we've
6 got here and I'm saying that's the implication.

7 Q. Right.

8 A. In some clearcut areas lake pH went
9 up.

10 Q. Right. Anything else?

11 A. No.

12 Q. Okay. So what we've got then is a
13 specific study. Madam Chair was asking you about a
14 specific study for a specific area, not a regional area
15 now, we're talking about a specific area--

16 A. Right.

17 Q. --where it showed that disturbance
18 such as wind storm, fire or clearcut logging in fact
19 lowered the acidity of the lakes in question.

20 A. Yes, that's true.

21 Q. Thank you. Now, I would like to move
22 on -- excuse me, if I can just have a minute, Madam
23 Chair.

24 MR. MARTEL: Dr. Hutchinson, in this
25 go-round can you tell me what the bottom line is? I'm

1 afraid that we have jumped from article to regional
2 studies, to larger areas, to clearcuts, to no
3 clearcuts.

4 Can you tell me what the bottom line is
5 with all of this? Do clearcuts, in your opinion,
6 affect the acidity or don't they?

7 THE WITNESS: They affect the water
8 chemistry and that has certainly potential -- there's a
9 general phenomenon and I'm sure we're going to get to
10 it, but the Likens example, one of the most extreme, in
11 which there is substantial increase of nitrate runoff
12 following clearcutting, but we're not distinguishing in
13 this discussion at all this morning between whole-tree
14 harvesting and conventional harvesting, and that's
15 important to make.

16 Regional precipitation, I think myself
17 and many other scientists feel is the primary cause of
18 the recent increases in acidity in lake systems and the
19 Sudbury area is a primary example. I think about 60
20 per cent of all of the lakes which are acidified in
21 Ontario, within I think 75 kilometres of Sudbury,
22 so I don't think that's a coincidence, so it's air
23 pollution rather than land use practises.

24 But there are other examples in which
25 land use practices have been related to acidification,

1 but the red herring is that land use practises are the
2 sole cause of all acidification. That was the red
3 herring we were referring to.

4 Q. Well, let's carry on to be fair to
5 you, Dr. Hutchinson. You in fact said they don't seem
6 to matter.

7 A. I have already said I think that's
8 a --

9 Q. So you're resiling from that --

10 A. I've already said that 'don't seem to
11 matter', matter is a bad word to use.

12 Q. I see. So you're now resiling from
13 your view in 1984?

14 A. No, no, I'm just resigning from the
15 wording of that.

16 Q. Well, that's a pretty important
17 conclusion since it's the last sentence that you give
18 in the article. Are you now repudiating your article,
19 sir?

20 A. No. Let me just have a look. Is
21 it -- do you want -- one of the things that we haven't
22 introduced into this discussion at all is the full-tree
23 harvesting argument would raise concerns and that's
24 come on stream substantially since this article was
25 written.

1 Q. I see, sir. Now, just let me stop
2 you there and ask you a question on that. If that's
3 the case why did you answer Mr. Hanna by saying
4 clearcutting, most especially full-tree harvesting,
5 leads to lake acidification. You didn't distinguish
6 there, you said all clearcutting. You emphasized
7 full-tree, but you said clearcutting.

8 A. But I don't have any difficulty if a
9 generalization is made in recognizing that there will
10 be exceptions.

11 Q. Oh, I see. All right. So we're
12 expected to infer an exception from what you just said
13 on Tuesday?

14 A. No, no, but the emphasis there is
15 especially full-tree harvest.

16 Q. Yes, but you went on --

17 A. That's what I'm saying.

18 Q. Well, sir, you've said it. You said
19 clearcutting, most especially full-tree harvesting.
20 You didn't say full-tree harvesting, you said
21 clearcutting, and are you now saying that we are
22 supposed to read between the lines and infer there are
23 exceptions to that?

24 A. Yes.

25 Q. I see. So if I hadn't asked you this

1 question today you wouldn't have corrected the Board
2 and told them that they had to infer that there are
3 exceptions to that?

4 A. The fact that we said especially, or
5 I said especially full-tree harvesting means that the
6 emphasis presumably is on full-tree harvesting.

7 Q. I see. So you're not concerned about
8 conventional harvesting then?

9 A. Much less so.

10 Q. I see. But you are concerned about
11 it? You are much less so --

12 A. Concerned, okay.

13 Q. You're much less concerned about
14 conventional, but you are still concerned about it
15 today?

16 A. In terms of lake acidification?

17 Q. Yes.

18 A. Okay.

19 Q. That's what we're talking about, sir.

20 A. Yes, there are -- well, there are
21 circumstances in which conventional harvesting can
22 cause problems, depends on the water chemistry of the
23 lake systems you're dealing with.

24 Q. I see. But in your 1984 article you
25 said it didn't seem to matter.

1 A. Well, I'm just trying to find where I
2 said it didn't seem to matter and see if I can give you
3 wording that --

4 Q. That you'd now correct?

5 A. Well, correct -- you know, don't you
6 think that things change.

7 Q. Go ahead, take your time.

8 A. If you could just point me at where
9 we say, it didn't seem to matter.

10 Q. You said it at the top of page 8.

11 A. Okay are.

12 A. Better wording would be that relative
13 to regional acid precipitation land use practice is of
14 much smaller consequence.

15 Q. I see. So if you had to do it all
16 over again you'd change your words; is that right?

17 A. Yes, I would.

18 Q. I see.

19 A. It doesn't actually change the
20 meaning much.

21 Q. Right. But you've not done any
22 further research into that since then; have you?

23 A. You mean into this red herrings?

24 Q. Yes.

25 A. No.

1 Q. All right. Let's move on then. And
2 I would like to refer you to the terms and conditions
3 which is Exhibit 1416 that Ms. Swenarchuk filed, FFT
4 draft terms and conditions, silvicultural
5 prescriptions, and look at paragraph 2(c) on page 3
6 which we have already had some discussion about with
7 you and Mr. Hanna and Ms. Swenarchuk.

8 And Madam Chair asked you a question on
9 Tuesday which interested me in respect of that
10 100-hectare restriction, and after a long discussion
11 with Mr. Hanna, Madam Chair asked you the following
12 question:

13 "Mr. Hutchinson has responded that he
14 thinks the size of fire area was an
15 important determinant in arriving at a
16 hundred hectares."

17 And then she turned to you and asked you,
18 and I'm quoting Madam Chair:

19 "Do you have other reasons for arriving
20 at the hundred hectare size for jack
21 pine, Dr. Hutchinson?"

22 And you said:

23 "No, I think I will leave it at that."

24 That being her comment, that the size of
25 fire area was an important determinant in arriving at a

1 hundred hectares. She asked you if there were other
2 reasons and you said:

3 "No, I think I will leave it at that."

4 And in Volume 241 of these proceedings
5 which is last Tuesday's evidence, in response to Ms.
6 Swenarchuk you said -- you get into a discussion of the
7 average size of fires and you around that time produced
8 Exhibit 1412 which were those Statistics 1987-1988, and
9 you said:

10 "If we take the average for the last 10
11 years in that record..."

12 A. Right.

13 Q. "...contained in Exhibit 1412,
14 I actually calculated that for you, the
15 last 10 years, which includes a few
16 fairly large years, that's 90.4 hectares,
17 is the average size of fires in the
18 province for the last 10 years."

19 And you went on to say, and I'm quoting
20 you:

21 "So if you want to have any, you know,
22 any relationship to natural events the
23 way we should look at it, I suggest, is
24 that we should perhaps be simulating
25 natural tree fall or simulating natural

1 Acreages burned and the average is, as I
2 say, for 25 years about 67.2 hectares."
3 So you gave a 10-year figure of 90.4 and
4 then a 25-year figure of 67.2.

5 A. Yes.

6 Q. In your witness statement at page 3,
7 and I'm looking at witness statement No. 1A, I'm sorry,
8 the supplement, and that's Exhibit 1405B, Madam Chair
9 and Mr. Martel.

10 MADAM CHAIR: Page...?

11 MR. CASSIDY: 3.

12 MADAM CHAIR: Thank you.

13 MR. CASSIDY: Q. You state in the second
14 paragraph, the second sentence:

15 "While it is true that very large fires
16 do occur naturally they are rare. It
17 seems extreme to argue that some huge
18 fires occur from time to time...", I'm
19 sorry,

20 "...that because some huge fires occur
21 from time to time that huge clearcuts are
22 justified as merely simulating a natural
23 phenomena."

24 And then you say:

25 "If the naturalness of fires is to be

1 used in determining size of clearcuts,
2 then the normal or average size would
3 seem a much more logical or reasonable
4 way to proceed."

5 And that appears to be consistent with
6 what you said on Tuesday, which is what I read to you
7 in response to Ms. Swenarchuk, and you can correct me
8 if I'm wrong on that.

9 A. I'm relieved to hear that.

10 Q. Thank you. Now, I want to refer you
11 to Exhibit 1419, and before we get into that I want to
12 be clear on something.

13 It's your view, in response to Madam
14 Chair, to her question, that in order to replicate
15 nature the 100-hectare clearcut size limit was set for
16 jack pine as a result of that being the average size
17 fire in Ontario; correct?

18 A. That that will be one rationale, yes.

19 Q. But you specifically said in response
20 to Madam Chair that that was the one that you would
21 leave it at.

22 A. Yes.

23 Q. Right. So that is in fact the
24 rationale; is it not?

25 A.. No.

1 Q. I see.

2 A. No.

3 Q. Are we expected to infer more things,
4 Dr. Hutchinson, in response to a question from --

5 A. Well --

6 Q. Just hear me out. Are we expected to
7 infer more things in response to a very simple question
8 that you were given and you answered for Madam Chair,
9 and you specifically said I would leave it at that, are
10 we expected now to infer more things?

11 A. I don't think you're expected to
12 infer more things, no.

13 Q. All right. Well, you go ahead and
14 tell us what additional things there are that you did
15 not tell Madam Chair on Tuesday?

16 A. No, I will explain the circumstances.
17 If you probably recall, that I was asked to endorse
18 these silvicultural descriptions and certain items I
19 endorsed on them and I do believe that would be one of
20 them. Unfortunately --

21 Q. That's the only one I'm looking at
22 for now.

23 A. Yeah. And that obviously these have
24 been developed by a group of people, so I didn't feel I
25 was in any position to know the rationale for all of

1 the reasons that these were developed.

2 Q. And as a --

3 A. In fact, I think in an earlier
4 question it was suggested that some other panels would
5 be dealing with this, and if I remember rightly it was
6 going to be Panels 3, 5 and 7 but I'm not -- 3 and 5 I
7 think.

8 Q. All right. So let me understand
9 then, and I just want to make clear of what your answer
10 was to Madam Chair. The only rationale that you
11 provided to Madam Chair, and it's the only rationale
12 you're aware of because other panels are going to deal
13 with it, is because of the average fire size; is that
14 correct?

15 A. I don't want to frustrate you, Mr.
16 Cassidy, but --

17 Q. You're not frustrating me, sir. Take
18 all the time you want.

19 A. There are other rationales for coming
20 out with a number of that magnitude.

21 Q. But the only one that you wanted to
22 leave Madam Chair with the impression of was the
23 average fire size.

24 A. It's the only one in which there was
25 direct evidence that I had given in terms of witness

1 statement.

2 Q. Right. And is that because, sir, it
3 deals -- average fire size to you, in your view, was a
4 common fire size?

5 A. The average it means is 50 per cent
6 less, it's -- sorry, it just simply means that that is
7 the average size of fire if you take the total number
8 of fires divided into the total acreage which burns.

9 Q. All right. You were concerned about
10 large-scale clearcuts because they're rare, among other
11 reasons, but that was a primary concern. And is it
12 your evidence that --

13 A. I was concerned about large-scale
14 fires.

15 Q. I'm sorry, large-scale --

16 A. I'm concerned about large-scale
17 clearcuts also, but...

18 Q. All right. You're concerned about --
19 thank you. You're concerned about large-scale fires--

20 A. Right.

21 Q. --being used because they are rare,
22 being used as a justification--

23 A. Yes.

24 Q. --or as rationale for large-scale --
25 other large-scale disturbances; you're concerned about

1 that because they are rare; correct?

2 A. Right, yes.

3 Q. And that is a function of numbers,
4 rarity; correct?

5 A. Yes.

6 Q. And when you talk about something
7 being rare, presumably they don't happen very often;
8 correct?

9 A. Relative to other events.

10 Q. And relative to the average size
11 fire; is that correct?

12 A. That's right.

13 Q. Okay. So that in fact you understand
14 that average size fires would occur more often than
15 large size fires; is that correct?

16 A. Well, there's a skewed distribution
17 for fire occurrence.

18 Q. Yes.

19 A. It's very skewed.

20 Q. Right.

21 A. The preponderance of fires is on the
22 small end and large fires account for, in terms of
23 acreage for a significant percentage of the acreage,
24 but not for the events.

25 Q. Right. So in fact the number of

1 average size fires that occur in this province is
2 extremely rare as well; is it not?

3 A. The number, you mean -- let's say,
4 exactly 100 hectares or whatever I said.

5 Q. Whatever. Somewhere around that
6 range is pretty rare?

7 A. Yes.

8 Q. So you're concerned about large size
9 fires being rare and not being -- because of that being
10 a justification for large-scale disturbances of other
11 types was because they were rare, one of your concerns?

12 A. Yes.

13 Q. But in fact the average size fire
14 you've referred to as being the rationale for 100
15 hectares is also rare; is that correct?

16 A. If you're saying --

17 Q. Just in numbers.

18 A. In numbers, to have a fire of exactly
19 100 hectares, I would be surprised if we have ever had
20 one.

21 Q. Well, sir, I'm talking about average
22 and I'm talking about a range, somewhere around a
23 hundred hectares.

24 A. Well, if it's the average and it's
25 got a skewed distribution then--

1 Q. Yes.

2 A. --the variation around that will be,
3 you will have more fires which are close to 100
4 hectares and the further you go away from that,
5 particularly on the skewed end of it, on the narrow end
6 of it, the more rare they become.

7 Q. All right. Well, let's turn to
8 Exhibit 1419 then.

9 A. Okay.

10 Q. Which is a collection of --

11 A. Which one is that, please? 1419.

12 Okay.

13 Q. Exhibit 1419 is a collection of --
14 called Canadian Forest Fire Statistics.

15 A. Mm-hmm.

16 Q. And I'm interested in the Tables 8.2
17 at the bottom of these various pages. And you will
18 note, Madam Chair, and Dr. Hutchinson, that there is --
19 this table is called Fire Distribution by Size Class,
20 and you will note that there are categories of size
21 class on the left-hand side, and then for the year 1978
22 there is a reference to the number of fires, and that
23 again goes to the frequency and rarity; correct, Dr.
24 Hutchinson?

25 A. Yes.

1 Q. And then you have on the right-hand
2 side of that column for 1978 areas burned in hectares,
3 and you have both of these figures, numbers and area
4 burned, expressed in absolute numbers and in
5 percentages.

6 And then on the right-hand side of this
7 Table 8.2 we have annual averages for what appears to
8 be a 10-year period.

9 A. Right.

10 Q. Now, if you just quickly flip through
11 these, Dr. Hutchinson, you will see that that table is
12 repeated for the years 1978, 1979, 1980, 1981, 1982,
13 and 1983 and we have 10-year averages for the periods
14 from '68 through to roughly '82. Do you see that?

15 A. Yes.

16 Q. All right. Now, if we look at the
17 number of fires - because that is what you're talking
18 about here in terms of rarity - we see that in the size
19 class of 0 hectares to 0.9 in 1978, if we can go back
20 to that first page, we have 470 fires which in fact
21 accounted for 50 per cent of the total.

22 A. Right.

23 Q. And then in the range from 0.1 to 4.0
24 we had 390 fires, which amounted to 41 per cent of all
25 fires.

1 A. Yes.

2 Q. In terms of number. And then 4.1 to
3 40, we had 57 fires which amounted to 6 per cent, and
4 then we get to the category of 40.1 to 200 - which by
5 my layman's math would include your average fire size,
6 either 67 hectares for 25 years or 90 hectares for 10 -
7 would be in that category; is that right?

8 A. Yes.

9 Q. And we saw that in 1978 we had 18
10 fires which accounted for 2 per cent of the number of
11 fires. Then when we get into fires over 200 hectares,
12 which would include everything up to 300,000 hectares
13 presumably, we had 5 fires and they accounted for 1 per
14 cent.

15 A. Right.

16 Q. Of the number of fires. Now, this
17 would support your evidence that in fact, in this
18 particular year, 90 per cent of the fires burned less
19 than 4 hectares; is that right?

20 A. Yes.

21 Q. Now, sir, you just indicated to me
22 that average size fires you would expect to be more
23 common than the large fires, and I'm talking a range
24 here of average being around -- somewhere around a
25 hundred hectares, not necessarily, and I see that in

1 fact they only accounted for 2 per cent of the fires in
2 1978.

3 And I invite you to look at the
4 statistics for the rest of the years and you will see
5 that it's virtually identical to the large size fires.
6 So in fact, sir, would you not agree with me that in
7 fact number of fires and occurrence is irrelevant?

8 A. Number of -- irrelevant to what?

9 Q. To a consideration of whether or not
10 you are, in your words, replicating the naturalness of
11 events.

12 A. Well, it looks like 100 hectares
13 would be far too generous an allowance if the sole
14 rationale was average.

15 Q. I see. So you're going to suggest
16 that in fact the clearcut restriction should be less
17 than 4 hectares?

18 A. No, no, I'm not going to suggest
19 that.

20 Q. I see. All right. Well then, you
21 you would agree with me then, to come back to my
22 question, that the number of fires is irrelevant to the
23 determination of whether or not you're replicating the
24 naturalness of disturbance and determining the
25 rationale for a 100-hectare clearcut size on jack pine?

1 A. Well, I don't know how we can argue
2 around the fact. I mean, if the rationale was average
3 sized fires, then the average size fire from the
4 Ontario statistics is about 90 hectares for the last 10
5 years.

6 Q. And I'm suggesting to you, sir, that
7 this document indicates that that is an irrelevant
8 statistic, in your words, in terms of numbers because
9 it is just as rare as any other large size fire?

10 A. Oh yes, I've already agreed to that.

11 Q. All right. So that in fact your
12 question about rarity is irrelevant.

13 A. Well, I don't feel it was irrelevant,
14 but...

15 Q. All right. Why is it relevant to
16 deal with large size fires and large size clearcuts but
17 it's -- why is it irrelevant in that context, but
18 relevant in the context of average fires?

19 A. Well, if we use your own figures
20 here --

21 Q. They're not mine, sir, they're CFS.

22 A. They're the one's you introduced this
23 morning. If we use the CFS statistics, I think you
24 would agree that the 91 per cent - say the 1978
25 example - 91 per cent of the fires appeared to have an

1 acreage of less than 4 hectares. That's a great deal
2 closer to 100 nevertheless, or 90 or whatever, you
3 know, these averages were that we introduced than some
4 of these gigantic fires.

5 Q. All right. Can I stop you there.

6 A. Sure.

7 Q. Looking over in terms of the
8 percentage of the area burned--

9 A. Mm-hmm.

10 Q. --you would agree that that is a
11 negligible amount?

12 A. Yes.

13 Q. And are you, therefore, suggesting
14 that we should focus on something that burns a
15 negligible amount of the forest and causes a negligible
16 disturbance; are you suggesting we use that - just hear
17 me out - are you suggesting that we use that as a
18 rationale for restricting clearcut sizes to 100
19 hectares?

20 A. I think the point is that the concept
21 that we should be simulating very large fires in terms
22 of clearcuts is pointing at extreme events.

23 Q. Right. And the concept of --
24 therefore, you would agree that the concept of focusing
25 on average size fires is also focusing at a rare event?

1 A. No.

2 Q. And it is also an extreme.

3 A. 100 hectares, as I point out, is a
4 great deal closer to the 91 per cent on the next page,
5 the 93 per cent which are less than 4 hectares; that
6 is, it's only 96 hectares greater than that compared
7 with the very rare events that have been introduced as
8 examples on -- what we might call on behalf of your
9 client which is many thousands of hectares.

10 Q. I see. So you're talking then
11 about --

12 A. So we're 96 hectares away; whereas
13 the extreme events the other way might be, you know,
14 30,000 hectares away.

15 Q. Right. And when you look at that
16 category, when you include that category of using their
17 statistics 40.1 to 200, when you include that in the
18 equation of area burned, it still only amounts to 5 per
19 cent of the total disturbance of area burned in the
20 province?

21 A. Yeah.

22 Q. And you're suggesting to me that we
23 should categorize a clearcut size based on disturbance
24 which impacts less than 5 per cent of the area of the
25 undertaking -- I'm sorry, of the area burned and ignore

1 the other 95 per cent?

2 A. No, I'm not suggesting that.

3 Q. I see. Well, what are you suggesting
4 when you focus on something that deals with only 5 per
5 cent of the disturbance in the province in terms of
6 area burned?

7 A. I was simply pointing out that
8 focussing on the largest events, the extreme events was
9 one point of view, which I didn't agree with, and that
10 it might be more appropriate to -- I think I actually
11 said, it might be more appropriate to focus on the
12 average size.

13 Q. And you agreed with me that the
14 reason that it might be more appropriate is because
15 they are not rare while large fires are rare. That was
16 your rationale; was it not?

17 A. That certainly was, yes.

18 Q. Yes. But average size fires are just
19 as rare; aren't they, Dr. Hutchinson?

20 A. Average size of 100 hectares. They
21 are certainly not just as rare, those are most extreme.

22 Q. Dr. Hutchinson, we're dealing with 1
23 per cent.

24 A. By definition they can't be. The
25 most extreme is the most extreme.

1 Q. You don't have any reason to dispute
2 these numbers, do you, sir?

3 A. No, no, but it doesn't tell you how
4 big they go to.

5 Q. How big what goes to?

6 A. The biggest size class, sir. The
7 last category is over 200.

8 Q. Yes. Well, presumably that's being
9 very generous because it's suggesting that over 200
10 would include a fire of 201 to 300,000; is that
11 correct?

12 A. That would be correct.

13 Q. Right. So a 300,000 fire would be
14 less than 1 per cent. But the point, sir, which you
15 don't seem to understand with the greatest of respect,
16 and I would like you to comment on now is: would you
17 not agree that fires in the average size range are 1
18 per cent of the number of fires and that is a rare
19 amount?

20 A. Yeah, but --

21 Q. Would you agree or disagree with
22 that?

23 A. But if we look at individual fires --

24 Q. Sorry.

25 A. You have got to distinguish between

1 percentage data and individual events, and you're
2 focussing right now on percentages and I was pointing
3 out that the largest fire must be, by definition, a
4 very rare event.

5 Q. All right. So there are a number of
6 fires, 16 fires in 1979.

7 A. Right.

8 Q. And focussing not on percentages but
9 numbers, would you agree that that is very rare as
10 opposed to the other numbers of fires?

11 A. It represents 1 per cent
12 approximately.

13 Q. Yes. And that's rare compared to 785
14 or 669?

15 A. Absolutely.

16 Q. Thank you. Now --

17 MADAM CHAIR: Mr. Cassidy, we are getting
18 close to our morning break.

19 MR. CASSIDY: This is a perfect time.

20 MADAM CHAIR: Thank you. The Board will
21 be back in 20 minutes.

22 ---Recess taken at 10:15 a.m.

23 ---On resuming at 10:40 a.m.

24 MADAM CHAIR: Please be seated.

25 MR. CASSIDY: Thank you, Madam Chair. We

1 will be breaking at twelve?

2 MADAM CHAIR: Yes, Mr. Cassidy.

3 MR. MARTEL: Will you be done by then?

4 MR. CASSIDY: I never make promises I
5 can't keep.

6 Just before I begin, yesterday you will
7 recall -- sorry, Tuesday you will recall I stood up and
8 asked that it may be necessary to speak to you for
9 approximately 15 minutes on a procedural matter.

10 I'm pleased to report, on behalf of all
11 counsel, that at the meeting yesterday when we were
12 discussing various scheduling matters the item which I
13 was going to raise got resolved, so it will not be
14 necessary to deal with that matter before the Board.

15 Q. Now, if I could turn back to Exhibit
16 1416, Dr. Hutchinson, which is the Forests for Tomorrow
17 draft silvicultural classifications -- pardon me,
18 prescriptions, and going back to paragraph 2(c) the
19 100-hectare restriction or limit or standard on jack
20 pine cut-overs, I take it - and am I entitled to assume
21 that - it is your understanding that in light of the
22 fact that this is a restriction based on area and not
23 in number, that the concern here is that the area of
24 disturbance is more important than the numbers of
25 disturbance?

1 A. Yes, I think that's a reasonable
2 assumption.

3 Q. So that in fact if we then turn to
4 Exhibit 1420 which is Fire Probabilities in Ontario's
5 Boreal Forest.

6 A. Okay.

7 Q. And we see the paragraph that is
8 underlined there and that in fact -- do you have that,
9 Madam Chair?

10 MADAM CHAIR: Yes, Mr. Cassidy.

11 MR. CASSIDY: Q. We have that -- at the
12 last paragraph on the left-hand column it states, at
13 the very, very bottom there:

14 "All fires 200 hectares and larger", and
15 then it goes into the upper right-hand corner,

16 "...as reported to the OMNR on official
17 fire report forms..."

18 If I can just have a minute, I think some
19 of the parties are having difficulty finding the
20 document.

21 "...constituted the dataset from which
22 the map was prepared."

23 And I understand this is a map of fire
24 history for the province, and it states that:

25 "According to Lochman...", who is a

1 member of the Department of Environment in Ottawa:

2 "...figures for the area burned in
3 Ontario during the period from 1961 to
4 1975 indicated that these fires..", that
5 is those over 200 hectares,

6 "...constituted 95.3 per cent of the
7 total area burned."

8 And it goes on to state, down a few more
9 sentences that:

10 "The largest fires account for the
11 preponderance of area burned."

12 Would that be consistent with the term
13 and condition then that area burned as opposed to
14 numbers is the relevant figure?

15 A. Well, that goes a little bit beyond
16 these descriptions. The descriptions are concerned
17 with size and they don't get into how many times that
18 should be repeated, but if you're asking my own
19 opinion, the concern would be with size.

20 Q. Yes. The concern is with respect to
21 size which is another way of saying size is area?

22 A. Yes.

23 Q. And the amount of area disturbed; is
24 that correct?

25 A. Yes, that's right.

1 Q. All right. So that is the relevant
2 figure?

3 A. Yes.

4 Q. Or the relevant factor?

5 A. Mm-hmm.

6 Q. And not numbers; is that correct?

7 A. That's correct.

8 Q. Thank you. All right. If I could
9 move on then to something that you told Mr. Hanna last
10 day on Tuesday, and near the end of his time before the
11 Board Mr. Hanna asked you about a statement, which is
12 in the last paragraph on page 3 of your witness
13 statement so you might want to have that in front of
14 you, that's Exhibit 1405A, that is witness statement
15 No. 1, and --

16 MS. SWENARCHUK: Which page?

17 MR. CASSIDY: Page 3.

18 Q. Excuse me. Mr. Hanna focused on the
19 sentence in the last paragraph where he talked about --
20 sorry, where you talk about:

21 "The room for errors in management
22 leading to site degradation is very large
23 and the added costs of a more informed
24 system surely more than balance out if
25 a longer term view is taken."

1 You will recall, Dr. Hutchinson, that Mr.
2 Hanna asked you about the room for errors and the more
3 informed system, and he said or you answered, in
4 explaining what the more informed system is you said,
5 and I'm quoting you:

6 "A more informed system means we are
7 going to have to do more site-specific,
8 if you like, investigation."

9 A. Right.

10 Q. And would it be fair for me to assume
11 that you're focusing on the fact that there is a great
12 degree of site variability across the province and you
13 want much more site-specific investigation to better
14 manage the timber resource in light of that
15 variability? Is that a fair statement of your
16 thoughts?

17 A. That would be certainly an important
18 component of it, yes.

19 Q. And I'mmm stating that fairly; am I?

20 A. Yes.

21 Q. That component. Thank you. And is
22 that because you want to make sure that the
23 prescriptions that are on the site, the management
24 prescriptions if you will, are suited to the site that
25 they are intended to manage?

1 A. Generally, yes.

2 Q. Then how, sir, does a blanket
3 management rule such as a 100-hectare clearcut size or
4 a standard recognize site variability?

5 A. Presumably it's got that already
6 built into it and in fact there's quite a lot of
7 additional information in terms of specifics in that
8 prescription if you'll just excuse me a moment while I
9 find it.

10 Q. Well, it's in Exhibit 1415 to assist
11 you and it's in your term and condition 2(c).

12 A. Well, it goes on -- what it says is
13 that cut-over shall not exceed 100 hectares, It doesn't
14 say anything about -- I mean, in fact it also says it
15 should be in blocks of various sizes not to exceed 100
16 hectares.

17 Q. I see. So the variability is
18 recognized then up to 100 hectares but not over; is
19 that correct?

20 A. In terms of the cut size, yes.

21 Q. I see. So that there is no
22 accounting for variability beyond 100 hectares in terms
23 of cut size; is that your evidence?

24 A. Well, this is a standard.

25 Q. I understand what it is, sir, but is

1 it your evidence that --

2 A. It's not the maximum.

3 Q. If you could please answer my

4 question.

5 A. Yes.

6 Q. Would you like me to repeat it to

7 you.

8 A. Sure.

9 Q. Is it your evidence that there is

10 variability accommodated in this prescription up to 100

11 hectares in terms of cut-over size but not be beyond

12 that?

13 A. Actually I'm not sure if I can answer

14 your question on that one.

15 Q. Try.

16 A. Well, I think it's probably a

17 reasonable assumption that the 100 hectares is --

18 there's a variety of reasons we have been through at

19 great length.

20 Q. Yes, I'm not interested in the

21 reasons, sir.

22 A. Right.

23 Q. I'm interested in the relationship

24 between a standard and site variability.

25 A. Okay. I can't answer your question,

1 I'm sorry.

2 Q. All right.

3 A. I don't know how that relates exactly
4 to site variability.

5 Q. That's fine. If you can't answer it,
6 that's fine. Now, if I can move on then to the issue
7 of watersheds. You said in your evidence - and I want
8 to make sure I'm clear on this - you said in your
9 evidence that you would recommend -- if I can just have
10 a minute.

11 Sir, you said in your evidence that you
12 would recommend that the percentage of any watershed
13 cut should not exceed 10 per cent. Have I got that
14 accurate?

15 A. Yes, I believe you have.

16 Q. All right.

17 MADAM CHAIR: Excuse me. Did you say --
18 was it clearcut should not exceed 10 per cent of the
19 watersheds?

20 MR. CASSIDY: My note is that he just
21 said cut.

22 MADAM CHAIR: All harvesting.

23 THE WITNESS: Right. Well, I'll say all
24 harvesting, yes.

25 MR. CASSIDY: Q. Right, that's what I

1 thought you said. Should not exceed 10 per cent.

2 MR. MARTEL: Was that in one cut, or were
3 you talking --

4 THE WITNESS: That was in terms of -- I
5 think it was --

6 MR. CASSIDY: Are you reading my notes,
7 Mr. Martel?

8 MR. MARTEL: I'm sorry, but I peaked.

9 MR. CASSIDY: It's quite all right, these
10 are the questions I've got to ask too because I don't
11 know what was going on there.

12 THE WITNESS: This was in terms of
13 watershed, I think.

14 MR. CASSIDY: Q. That's what you said.

15 A. 10 per cent, yes.

16 Q. It wasn't my evidence. Go ahead.

17 A. Yeah, well...

18 Q. All right.

19 MR. CASSIDY: Do you want to ask your
20 question, Mr. Martel?

21 MR. MARTEL: I thought about it the other
22 night when we were reviewing this, and I couldn't get a
23 handle on whether it meant 10 per cent and then wait a
24 period of time and come back and do another cut, or 10
25 per cent would be the total amount in any given

1 watershed.

2 THE WITNESS: No, it means 10 per cent at
3 any one time, but also it would have to take into
4 account leaving some reasonable interval so that you
5 didn't have 10 per cent one year, 10 per cent the next
6 year, 10 per cent the next year and so on. So it was
7 leaving some interval for adequate regeneration.

8 MR. CASSIDY: Q. What interval?

9 A. I haven't thought that out.

10 Q. I see. All right. I want to turn
11 then to Tab 24 of your source book which -- I had to
12 tab your articles, but I can refer you to the title,
13 it's the Schindler study, Schindler, Newbury et al, and
14 it is the study on effects of a wind storm and forest
15 fire. This is in the source book, Madam Chair, for
16 witness statement No. 1. I could assist you in finding
17 it, if you need.

18 MADAM CHAIR: How far is it into the --

19 MR. CASSIDY: It's near the back.

20 MS. SWENARCHUK: They are filed
21 alphabetically by author, Madam Chair.

22 MR. CASSIDY: Near the back of the
23 collection, Madam Chair.

24 MADAM CHAIR: All right, thank you. We
25 have it, Mr. Cassidy.

1 MR. CASSIDY: Thank you.

2 Q. If we can turn -- do you have that,
3 Dr. Hutchinson?

4 A. I haven't reached it yet.

5 MS. SWENARCHUK: (handed)

6 THE WITNESS: Thank you.

7 MS. SWENARCHUK: Do you have an extra
8 copy?

9 MR. CASSIDY: Yes. (handed)

10 MS. SWENARCHUK: Thank you.

11 MR. CASSIDY: Q. If I could turn you to
12 page 329 of that study which is in fact the very next
13 page after the first one.

14 A. Right.

15 Q. And there's a diagram there, it's
16 figure 1 of Rawson Lake; do you see that?

17 A. Yes.

18 MR. CASSIDY: Do you have that, Madam
19 Chair?

20 MADAM CHAIR: Yes, Mr. Cassidy.

21 MR. CASSIDY: Q. I'm having some
22 difficulty with your understanding of watersheds or my
23 understanding of watersheds.

24 As I see it - I'm just using this as an
25 example because I saw last night it said Rawson Lake

1 watershed and it seems to me that there are potentially
2 three watersheds there, the northwest sub-basin
3 watershed, the northeast sub-basin watershed, and the
4 east sub-basin watershed. Is it fair for me to think
5 that there may in fact be three watersheds within an
6 overall watershed?

7 A. Yes.

8 Q. Then is the 10 per cent that you're
9 recommending that it not be -- that it be 10 per cent
10 of the whole Rawson watershed, the thre combined, or is
11 it 10 per cent of one and 10 per cent of another or 10
12 per cent of another?

13 A. It would be 10 per cent of the whole.

14 Q. 10 per cent of the whole. Then is it
15 possible to cut all 10 per cent within one of those
16 watersheds?

17 A. I'm just trying to think about that
18 one with respect to water chemistry. If you had a
19 small sub-watershed it would be possible to cut --
20 which was 10 per cent, then it would be possible to cut
21 that in its entirety, yes, if that was the 10 per cent.

22 Q. Can you define the scale that that
23 watershed should be delineated at?

24 A. This one?

25 Q. Well, of the watershed that you have

1 in mind.

2 A. That I am talking about?

3 Q. Yes. I'm just using this as example
4 in respect of three in one.

5 A. Well, I haven't got in mind the
6 Hudson's Bay lowlands as a watershed.

7 Q. Okay.

8 A. So it would be on a substantially
9 smaller scale than that.

10 Q. In fact watersheds can go -- I mean,
11 you can have an infinite size of watershed there, and I
12 think you've just referred to the fact that a large
13 amount of water is drained into the Hudson's Bay; is
14 that correct?

15 A. Yes that's right.

16 Q. And in fact ma large amount of the
17 rivers and streams in the province drain into the
18 various Great Lakes?

19 A. Right.

20 Q. Right. And is there a particular way
21 in which this Board, if it chose to, could put that
22 watershed in respect of a management unit, on a
23 management unit scale?

24 A. Well, I think it would have to look
25 in each of the management units and I don't think the

1 Board would wish to do this, but this could be done,
2 and perhaps should be done, the watersheds within the
3 management units, I think they were identified and how
4 many sub-units you've got in there also I suspect.

5 Q. So there's all of these additional --

6 A. I don't know, but I suspect.

7 Q. I'm sorry.

8 A. I don't know whether the sub-units
9 are identified but, if not, they could be.

10 Q. So there are all these other
11 additional considerations to cutting of a watershed
12 that would have to be done; is that fair to say; in
13 other words, to determine what is the appropriate
14 amount?

15 A. Yes, yes.

16 Q. I see. And you didn't mention any of
17 that in your evidence; did you?

18 A. No.

19 Q. All right. Then if we can move on.

20 I would like to move to the evidence in respect of your
21 witness statement where you discussed a study in
22 respect of the Hubbard Brook area in New England and
23 you referred to that in a number of places and that,
24 just for your reference and the Board's reference, can
25 be found at pages 5 and 6 of your witness statement,

1 Panel 1, and pages 22 and 23 of the witness statement.
2 And if we could turn to that latter reference, please,
3 and this is in Panel 1, Madam Chair.

4 MADAM CHAIR: What was the page again?

5 MR. CASSIDY: 22 and 23.

6 MADAM CHAIR: Thank you. Are we finished
7 with the source book?

8 MR. CASSIDY: Yes, I just wanted to look
9 at that map.

10 MS. SWENARCHUK: I'm sorry, what was the
11 second page reference?

12 MR. CASSIDY: 22 and 23.

13 MS. SWENARCHUK: Of Panel 1?

14 MR. CASSIDY: Correct.

15 Q. And if we can turn to page 22.

16 A. Right.

17 Q. You talk about stream chemistry.

18 A. Yes.

19 Q. And stream chemical quality, and you
20 refer to the Likens, Pierce and Bormann study which is
21 dated 1986 where they report on their overall findings
22 of this clearcutting on stream chemistry.

23 Now, just bear with me. The Exhibit 1422
24 which was filed this morning, do you have that in front
25 of you?

1 A. I'm sorry I haven't numbered these so
2 you will have to tell me.

3 Q. It's a study by Martin, Noel and
4 Federer.

5 A. Yes.

6 Q. Now, that study is dated 1985, that
7 is Exhibit 1422. You did not refer to that study in
8 the witness statement, Dr. Hutchinson, you referred to
9 the 1986 study; correct?

10 A. Yes.

11 Q. By some of the same authors. I would
12 like to turn you to the first page of that,
13 Clearcutting and the Biogeochemistry of Streamwater in
14 New England, that's the title of Exhibit 1422, and I
15 would like to refer you to the first paragraph in the
16 right-hand column. Do you have that?

17 A. The first page of the article,
18 right-hand column.

19 Q. Where it states: "For this study..."

20 A. Yes.

21 Q. It states that:

22 "For this study we included conventional
23 clearcutting and whole-tree harvesting in
24 the term clearcutting."

25 A. Yeah.

1 Q. And then it goes on to define both
2 conventional and whole-tree, and again whole-tree is
3 what we would consider here to be full-tree but they
4 define it or call it whole-tree?

5 A. Right.

6 Q. Then we get into a discussion in this
7 paragraph -- I'm sorry, article on the next page, which
8 is page 687 of the article. And if I can refer you to
9 the left-hand column on page 687, the second paragraph
10 from the bottom starting with:

11 "Coniferous forests of Maine...", and it
12 goes on to state that:

13 "These forests and central hardwood
14 forests of Connecticut had nitrogen
15 concentrations in all streams, clearcuts
16 and references of .1 milligram...", per
17 litre I assume,

18 "...or less, no cutting effects were
19 apparent."

20 A. Right.

21 Q. "Nitrogen concentrations in the
22 stream from the coniferous forests in
23 Vermont were slightly higher."

24 The references would be the uncut
25 portions; is that correct?

1 A. Yes, I think so.

2 Q. Right. Then I would like to take you
3 to the next page where we have a paragraph on the
4 left-hand column, this is page 688 Mr. Martel, where
5 the first full paragraph states:

6 "Differences in calcium and potassium
7 concentrations in streams from clearcuts
8 and from references at sites throughout
9 New England indicating that clearcutting
10 does affect stream chemistry. Only in
11 the northern hardwood forests of central
12 New Hampshire did nitrate concentrations
13 in streams increase to any great extent.
14 We...", presumably the authors,
15 "...searched New England for chemistry
16 changes equal to or greater than that
17 previously measured in the White
18 Mountains (Pierce, et al)...", and that
19 would be the Hubbard Brook area; is that correct?

20 A. Yes, I believe it is.

21 Q. "...but found surprisingly little
22 effect of clearcutting on stream
23 chemistry outside the White Mountain
24 area. Variability in nitrogen, calcium
25 and potassium concentrations was often as

1 much between references as between
2 references and clearcuts."

3 Now, you referred in your paper to some
4 40 papers that all pointed in the same direction. Is
5 this one included within the 40 papers all pointing in
6 the same direction?

7 A. I didn't refer to this study.

8 Q. Sorry?

9 A. I didn't refer to this study.

10 Q. I see. So beyond the 40 papers that
11 you refer to, there are other articles out there?

12 A. Oh yes, absolutely.

13 Q. Which suggest perhaps an opposite
14 direction from some of your conclusions?

15 A. There will be --

16 Q. Just hear me out, sir, I haven't
17 interrupted you.

18 A. I was rushing to agree with you.

19 Q. That's fine. I want to make sure the
20 record is clear, and there are other papers beyond the
21 40 which point in an opposite direction to your views;
22 is that correct?

23 A. There will be some, certainly.

24 Q. And this one in terms of stream
25 chemistry points in an opposite direction of your view

1 that it affects stream chemistry?

2 A. It doesn't entirely point in an
3 opposite direction.

4 Q. I see. Well, in respect of those
5 pararaphs, sir, would you agree that the authors went
6 outside the White Mountain area and could not find, or
7 found surprisingly little effects of clearcutting on
8 stream chemistry ery outside that area?

9 A. That's what it says, yes.

10 Q. Thank you. Now, in your evidence,
11 Dr. Hutchinson, you said that -- let me try and quote
12 you again, you said that:

13 "If we delay...", and this is in response
14 to a question from Ms. Swenarchuk, you said that,

15 "If we delay the normal intervention,
16 which will be the fire...", and this was
17 in respect of jack pine,

18 "...if we keep on delaying that, if we
19 simply don't finish it, with bad ground,
20 a lot of ancient trees hoping to die,
21 there is a natural replacement taking
22 place of other species which are able to
23 get into this understorey."

24 And you go on to state that:

25 "If we simply ban fire, if we are ever

1 clever enough to do that...", which you
2 don't recommend,

3 "...but if we ever did that, then we
4 wouldn't simply lose jack pine stands
5 completely we would have a progression
6 through jack pine to other forest
7 species, and it would be to my mind a
8 healthy, new and different forest."

9 A. Mm-hmm.

10 Q. And that is also referenced in your
11 witness statement at page 8 in Panel 1A, and I don't
12 think it's necessary for anyone to pull it out, I will
13 just simply read it where it --

14 MS. SWENARCHUK: Panel 1A?

15 MR. CASSIDY: Page 8, Panel 1A where it
16 is stated that, in reference to a Quetico study, that
17 there would be replacement of -- you state that:

18 "In the absence of fire, jack pine
19 forests gradually give way to spruce and
20 hardwood tree species."

21 And this is this concept of natural
22 replacement; is it not, that you're discussing, Dr.
23 Hutchinson?

24 A. It's a succession, yes.

25 Q. Succession, I'm sorry. And you, in

1 your words, call that a new, healthy and different
2 forest. Do you recall saying that?

3 A. I don't recall saying it, but I'm
4 sure...

5 Q. You're sure the reporter over here
6 got it right?

7 A. Yes.

8 Q. Good. Is it the case then, sir, that
9 the different forest that you can envisage would be
10 one, for example, where a jack pine forest is replaced
11 naturally over time by a balsam fir forest?

12 A. That would be -- yes, that would be
13 in a natural succession.

14 Q. Okay. And that's one that could be
15 envisaged within this concept that you've been talking
16 about?

17 A. Yes.

18 Q. That's a reasonable expectation, if
19 you will?

20 A. Yes.

21 Q. All right. And would you encourage
22 that?

23 A. Would I encourage it? Well, I'm not
24 God, so I wouldn't --

25 Q. No, but you could be a forest manager

1 and I'm asking you to put yourself in the shoes of that
2 person, and would you encourage that?

3 A. I don't believe there would be any
4 great desire to create balsam fir forests.

5 Q. All right. So you wouldn't advocate
6 then the natural succession which you have been
7 discussing in your evidence and page 8?

8 A. No, I'm not saying that.

9 Q. All right. So that's not something
10 you're advocating?

11 A. You're saying what might a forest
12 manager want to encourage, and I'm saying I don't
13 believe we would be trying to encourage a monoculture
14 of balsam fir.

15 Q. Okay. As a forest manager you would
16 encourage that natural succession to occur?

17 A. I didn't say anything that a forest
18 manager would say, but anyhow --

19 Q. Well, I'm asking you to cast yourself
20 in those shoes, sir.

21 A. All right. Then we'll play pretend
22 for a minute. Yes, I don't think --

23 Q. No one is playing here, this is a
24 very serious game, sir. I'm asking you to cast
25 yourself in those shoes and tell me if you would

1 encourage that natural succession?

2 A. Okay. As a forest manager I would be
3 concerned if we were to convert large quantities of
4 jack pine into balsam fir.

5 Q. Yes. So you would not, therefore, as
6 a forest manager encourage that natural succession to
7 take place; is that correct?

8 A. Not on a large scale, no.

9 Q. Is balsam fir particularly well
10 adapted to the majority of the jack pine sites?

11 A. Well, it gets in as a later
12 successional species into many of them, yes. It's a
13 natural later successional species.

14 Q. Yes, I understand that, sir, but is
15 it particularly well adapted; does it survive
16 particularly long?

17 A. In the absence of fire it will
18 survive for a long term.

19 Q. I see. And, therefore, I take it you
20 would not think it acceptable, since you wouldn't
21 encourage it, to lose such a major component of the
22 ecosystem as jack pine through this natural succession
23 process in a mode of fire suppression?

24 A. You know you're casting me as a
25 forest manager and you're asking me to stop fire too to

1 do this.

2 Q. We're operating in a fire suppression
3 mode, sir. That was your evidence.

4 A. But that hasn't happened either in
5 the past or under the fire suppression mode, we haven't
6 got huge tracts of balsam fir forests.

7 Q. Right. So that the --

8 A. We've got predominantly jack pine--

9 Q. So that the scenario --

10 A. --in those areas.

11 Q. So that the scenario you have painted
12 then is one that has not happened and not one that you
13 would encourage, the scenario of jack pine replacement
14 over time to a new, healthy and different forest?

15 A. Well, I think the point is that it's
16 frequently been implied that jack pine has some -- that
17 it is a very short lived species and the point of the
18 article that you're referring to there is that some
19 trees have the capability of living for a long period
20 of time and that in the absence of fire for long
21 periods of time, that is in excess of 200 years I
22 think, then balsam fir would be a successional species
23 which would begin to take over.

24 Q. All right.

25 A. And that's a natural event but it's

1 obviously a rare event.

2 Q. All right. And in those set of
3 circumstances that is not something you would
4 encourage?

5 A. As a forest manager?

6 Q. Correct, yes.

7 A. Well, if it's a very rare event it's
8 only occupying a small amount of your area.

9 Q. So you don't even --

10 A. As an ecological forest manager, I
11 don't think it would upset me too much.

12 Q. I see. But as a forest manager it
13 would upset you.

14 A. I don't know. I can't, you know,
15 totally cast myself in the role of a forest manager.

16 Q. Okay. So a minute ago you wouldn't
17 encourage it, but now you're a little unsure; is that
18 right?

19 A. No, no, I'm not saying that. I'm
20 pointing out that this is a rare event, it's occupying
21 a very small amount of the area, these old growth
22 forests.

23 Q. Yes.

24 A. Right.

25 Q. Yes.

1 A. And that happens to be in Quetico
2 anyhow, the one you're referring to, which is already a
3 provincial park, it's set aside as a provincial park.

4 Q. It's not particularly representative
5 of the boreal; is it?

6 A. Well, it's sitting right on the edge
7 of Lake Superior.

8 Q. Yes, but there are --

9 A. It's not particularly representative,
10 no.

11 Q. Thank you. All right. Now, you also
12 said that it is -- I just want to make sure I'm quoting
13 you rightly here. If you just bear with me, Madam
14 Chair.

15 You were asked by Ms. Swenarchuk on
16 Monday, October 1st, Volume 240, you were asked with
17 regard to a description that you gave of an overmature
18 forest:

19 "Is it the case that overmature stands
20 typically do not have younger forests
21 growing up behind it."

22 Are you with me?

23 A. Yes.

24 Q. And you answered:

25 "No, I mean that's a hypothetical case

1 that we prevent anything else coming in
2 and just wait for the trees to die.
3 That's just a totally artificial
4 situation."

5 In your travels in the boreal forest, Dr.
6 Hutchinson, is it your evidence that you have never
7 come across a jack pine lichen site in a natural
8 non-plantation forest?

9 A. Oh yes, I have come across jack pine
10 lichen sites in non-plantation forests, yes.

11 Q. All right. And what grows in the
12 understorey in those situations?

13 A. Well, generally there's -- presumably
14 you mean tree species?

15 Q. Mm-hmm.

16 A. Yes?

17 Q. Yes, that's what we're interested in.

18 A. Okay. Well, see I'm interested in
19 other things too.

20 Q. Good. Go ahead.

21 A. But you will find balsam coming in--

22 Q. Mm-hmm.

23 A. --into these forests. It depends on
24 the age of them; that is, how long it is since the last
25 fire.

1 Q. So your evidence is that balsam --

2 MS. SWENARCHUK: Excuse me, let the
3 witness answer the question.

4 MR. CASSIDY: Sorry, I thought he had
5 answered it.

6 Q. You'd answered it?

7 A. Well, you're asking me what I might
8 find --

9 Q. Sorry, was I interrupting you. Was I
10 interrupting you?

11 A. No, I don't think so.

12 Q. Thank you. Go ahead.

13 MS. SWENARCHUK: Sorry.

14 MR. CASSIDY: No problem.

15 THE WITNESS: You will also find, you
16 know, generally there's the occasional mountain ash and
17 where there's been disturbances you might find birch
18 and things of this kind, sometimes spruce, black
19 spruce.

20 MADAM CHAIR: Excuse me, Dr. Hutchinson.
21 After mentioning mountain ash, you mentioned birch?

22 THE WITNESS: Yes.

23 MADAM CHAIR: And following birch, the
24 court reporter just missed a few examples.

25 THE WITNESS: Oh, I'm sorry. And then I

1 mentioned spruce, black spruce. I mean, I think it's
2 rather difficult to find a total monoculture of one
3 species of tree.

4 MR. CASSIDY: Q. I wasn't suggesting
5 that, sir. I was asking you in your travels what you
6 had seen on jack pine lichen sites in a natural
7 non-plantation forest, and your evidence is - and we'll
8 listen to it - is that it was balsam fir, birch, what
9 else?

10 A. And spruce.

11 Q. And spruce?

12 A. Mm-hmm.

13 Q. And this is wide-spread throughout
14 the boreal in your travels or just ones that you've
15 observed here and there?

16 A. You mean, is this a wide-spread
17 phenomenon that some of this material comes into --

18 Q. Yes.

19 A. Well, I think it's -- I mean, one
20 would have to start defining the areas I've looked in.
21 If you want to do that, we can do that, but I'd say --

22 Q. In the areas that you've looked at--

23 A. Yes.

24 Q. --is it a wide-spread phenomenon?

25 A. Fairly wide-spread, yes.

1 Q. Is it safe to assume that you have
2 not looked at the whole boreal forest?

3 A. Absolutely.

4 Q. I see. And If there was evidence
5 before this Board that indicated otherwise, it perhaps
6 would not surprise you that there is not the
7 predominance of --

8 A. Predominance of what?

9 Q. There is not an understorey of those
10 species coming in, if there was evidence before the
11 Board of that, would that not surprise you?

12 A. Well, it would depend on the area.

13 Q. I see. So your comments then that
14 you just made is very much site dependent; is that
15 correct?

16 A. Well, sort of regional dependent,
17 yes.

18 Q. Regional dependent.

19 A. Yeah.

20 Q. Okay. Well, what regions of the
21 boreal then?

22 A. Well, I'm talking about principally
23 about the eastern Ontario boreal.

24 Q. Let's go to the map. Where's that?

25 A. Okay. Well, I would be talking about

1 Kapuskasing, Timmins, Kirkland Lake, through Matheson,
2 and this area in here, towards the Quebec border.

3 Q. Predominantly clay belt?

4 A. Yes, predominantly clay belt, yes.

5 Q. Now, you said in your evidence that
6 sandy soils are nutrient poor in the boreal. Do you
7 recall that?

8 A. Yes.

9 Q. Does jack pine grow well in sandy
10 sites?

11 A. Does it grow well? Yes.

12 Q. Is it correct then to say that jack
13 pine is well adapted to growing on the nutrient poor
14 sites you've referred to?

15 A. Yes.

16 Q. Is it in fact the only species that
17 is suited to those sites?

18 A. To those nutrient poor sites. It's
19 probably --

20 Q. Sandy sites, yes.

21 A. Yes, it's probably the best suited.

22 Q. Thank you. Is it not then a species
23 whose continued existence should be encouraged on those
24 sites?

25 A. Yes.

1 Q. And with the warmer temperatures that
2 you suggest will or may come with climate change is
3 jack pine a preferred species to deal with that?

4 A. I think on those sites, yes.

5 Q. Great. Dr. Hutchinson, in response
6 to a question from either Mr. Hanna or Madam Chair
7 about what should we do about climate warming, you
8 talked about nursery stock should be developed that is
9 responsive to those changes and can deal with climate
10 changes. Do you recall that?

11 A. Yes.

12 Q. How does natural regeneration fit
13 into your concern about dealing with climate warming?

14 A. How does -- well, obviously if we
15 were to leave things to their own devices there would
16 be a process of natural selection would take place.

17 Q. Yes. Why didn't you mention that
18 there should be something done with natural
19 regeneration dealing with climate change and why did
20 you focus on nursery stock?

21 A. Well, if that's the way we can
22 intervene and manipulate, you know, on our -- very
23 directly, I'm suggesting what climate change may come
24 on quite rapidly, and if that's the case, it's very
25 likely in the southern boreal regions that the tree

1 species which are presently there, there will be a
2 sorting out of them and we will either have to stand
3 back and watch this sorting out take place or we will
4 have to intervene.

5 Q. Management intervention I guess is
6 the term we have used here in the hearing?

7 A. Yes, right.

8 Q. And you see that as a necessity in
9 response to the climate warming?

10 A. It may well be in the southern
11 regions, yes.

12 Q. So how does natural regeneration
13 strategy of Forests for Tomorrow fit in with that?

14 A. Well, that would go along with the
15 direction of -- okay, you mean in terms of climate
16 warming specifically?

17 Q. That's what we're talking about.

18 A. Okay. In the southern regions, if we
19 put in a great deal of variability by -- if we maximize
20 variability by encouraging natural regeneration, then
21 in terms of probability we are going to expose
22 favorable genotypes to the environment so that there
23 will be a selection in the direction of adaptation.

24 Q. Where does your management
25 intervention come in?

1 A. Well, where you're doing planting.

2 Q. I see. So that the natural
3 regeneration strategy will not deal with climate
4 warming, you will need planting; will you not?

5 A. No, no, no, I'm not saying that.

6 I don't think anybody knows exactly, quite frankly, how
7 to deal with this climate warming phenomenon in terms
8 of management interventions. We are basically going in
9 two directions at the same time; one is we are
10 already -- it's quite normal, we're going for natural
11 regeneration and we're going for artificial
12 regeneration, and we have got to try and look at both
13 of those in respect to climate warming.

14 Now, I'm saying that going the natural
15 way will maximize your variability. Where you're going
16 the artificial way, then you may want to do some
17 screening beforehand, you know, experimental screening
18 so that you've got drought tolerant strains or whatever
19 that are suitable to the site.

20 Q. So if one were to characterize an
21 ecological process, a desirable ecological process to
22 be to emulate natural processes it would, on its own,
23 fail to deal with the effects of global warming, it
24 would also require a management strategy of artificial
25 regeneration to deal with global warming; is that fair

1 to say?

2 A. It might.

3 Q. You're not able to say yes or no?

4 A. It wouldn't mean anything if I did
5 because I don't think we know quite what we're getting
6 into with climate warming.

7 Q. I see.

8 A. I mean, Mr. Hanna was posing that
9 question: How do you deal with it and he wanted a
10 direct answer: How does a manager on the spot deal
11 with it, and there isn't a clear answer to that.

12 Q. But it seems to me you're fairly
13 clear this morning that in fact natural regeneration by
14 itself would not be sufficient to deal with the issue
15 of global warming and there would be some management
16 intervention that would be required; is that a fair
17 characterization of your evidence this morning?

18 A. I don't think it is actually, no.

19 Q. Well, I don't want to be unfair to
20 you. You tell me what it is.

21 A. Very nice of you.

22 Q. Thank you.

23 A. Okay. The evidence is that we're
24 faced with - I don't want to bore you all - but we're
25 faced with climate warming which could come on quite

1 rapidly. There's a possibility that we have genetic
2 stock out there now which would be able to handle it
3 and maybe some of the more southerly, you know, jack
4 pine from the States and things could make it, but
5 there's not too much down there, so this would be a
6 hope rather than expectation.

7 The natural processes will take place and
8 that will expose the maximum number of genetic types
9 out there or genotypes but, quite frankly, I think we
10 might fall short in that sense.

11 Q. Okay.

12 A. And if we fall short, then we're
13 going to have to do something about artificial
14 regeneration if we're going to maintain forest cuts.

15 Q. Fine, let's move on then. I want to
16 refer you to an exhibit entered this morning, the
17 Carlisle and Methven paper. I will get you the exhibit
18 number here, it's Exhibit 1421, Dr. Hutchinson, and if
19 you could have that in front of you.

20 A. Just be patient for a moment, I'll
21 find it.

22 Q. Sure. I have an extra copy.

23 A. Yes, I've got it.

24 Q. And I want to refer you also to
25 Exhibit 1405B, Panel witness statement 1A, your

1 supplement and -- let me just have a minute, Madam
2 Chair. I'm sorry. I apologize, Dr. Hutchinson, it's
3 Panel witness statement 1 not 1A, Exhibit 1405A and
4 we're talking about fire here.

5 So I was going to 1A, but getting back to
6 1, and if I refer the Board to page 29 of Exhibit
7 1405A, and on page 29 you talk about some of the
8 advantages of fire or some of the characteristics of
9 fire, and at the very top you state that, in the first
10 full -- second full sentence:

11 "Losses to groundwater and streams do
12 increase but for one or two years
13 only in most cases, by which time
14 nutrient capture on site has stabilized
15 loss."

16 And that is after a fire; is that
17 correct, Dr. Hutchinson?

18 A. Yes, I think so. Yes.

19 Q. All right. So what we have then, as
20 I understand it, is atmospheric inputs coming back onto
21 the site; is that what you refer to when you use the
22 words 'nutritent capture' as one of the ways of
23 nutrient capture?

24 A. Well, it also means that vegetation
25 will have grown up which is able to retain the

1 available nutrients on site and, of course, there will
2 be precipitation going on throughout this period.

3 Q. Okay. So there is precipitation and
4 revegetation after a fire?

5 A. Mm-hmm.

6 Q. Would you agree with me that there is
7 precipitation and revegetation after a clearcut as
8 well?

9 A. Yes, I'm sorry.

10 Q. That's more of a comment on Mr.
11 Huff's microphone there than anything else.

12 Is it the case then that nutrients will
13 fall on a site whether or not it's been burned or
14 whether or not it's been clearcut?

15 A. Yes.

16 Q. All right. Now, I think you used the
17 words 'whistling in the wind' to describe nutrient
18 inputs at one point as a hope that they would come back
19 to the site in adequate numbers, and I think you used
20 the words in response actually to Mr. Martel last
21 Tuesday, that nutrient loss is most unlikely to be
22 replaced by some acceleration of mineralization or rock
23 weathering or atmospheric inputs, and your words are
24 'that's whistling in the wind frankly to hope that'.

25 A. Right.

1 Q. Now, turning to Exhibit 1421, if we
2 can turn you to page 4 -- I'm sorry, Table 4 of that
3 document - which is by my count, Madam Chair, on page 6
4 of Exhibit 1421 - it's Table 4 and -- it has Table 4
5 and it's hard to see the description but it states
6 examples of nutrients in precipitation in North
7 America. Do you have that, Dr. Hutchinson?

8 A. Mm-hmm, yes.

9 Q. Is it your evidence -- let's back up.
10 Looking at the samples taken in Canada and in the Lake
11 Superior and Lake Huron region we have 1.6 kilograms of
12 per hectare per year of potassium in precipitation in
13 that area, we have 4 kilograms per hectare of calcium,
14 .7 kilograms per hectare per year of magnesium, and we
15 have 6.8 kilograms per hectare per year of nitrogen,
16 then we have similar figures - which I'm not going to
17 repeat because you can see them - with respect to Lake
18 Huron and another area which potentially is within the
19 area of the undertaking, the Muskoka area, Item No. 10
20 and the Kenora area Item No. 11, and this is per year.

21 Is it your evidence that these nutrient
22 inputs is whistling in the wind?

23 A. Well, these nutrient inputs -- I've
24 never for a minute suggested that we don't have
25 nutrient inputs from the atmosphere.

1 Q. And I'm not saying you suggested
2 that, sir. I'm asking you if they're whistling in the
3 wind when you get these amounts of nutrient inputs and
4 precipitation in those areas?

5 A. Whistling in the wind to sustain the
6 next generation of forests. In the event we had a loss
7 of a substantial percentage of the nutrients reserves,
8 yes, I don't think we would be able to sustain the
9 forest based entirely on precipitation alone.

10 Q. So you're totally discounting or
11 virtually discounting these nutrient unputs?

12 A. Oh no, I'm not. I'm just saying that
13 you have a need to add all of these things. My comment
14 about whistling in the wind I think was with respect to
15 full-tree harvesting.

16 Q. I understand that, sir. I read the
17 comment to you.

18 A. Right.

19 Q. And, therefore, your evidence is that
20 these will not make up for the nutrient losses that
21 have occurred as a result of full-tree harvesting; is
22 that your evidence?

23 A. In the normal rotation, yes, that
24 would be correct.

25 Q. And you've not done any studies, as

1 you have indicated earlier, on that; is that correct?

2 A. That's correct.

3 Q. All right. So you're making that
4 without having done any study, that comment?

5 A. Based on reading of the literature.

6 Q. Right. So that these occur on an
7 annual basis per hectare per year, and when--

8 A. Yes.

9 Q. --when you add all these up over,
10 let's say, a 90-year rotation, your evidence is that
11 these will not be sufficient, in addition to other
12 factors such as weathering or nutrients already left in
13 the soil after full-tree harvesting. That's your
14 evidence?

15 A. Well, you know, you're asking me to
16 evaluate these figures from this particular study, from
17 this particular set of data and say whether that would
18 be sufficient for --

19 Q. Right.

20 A. --for replacement of full-tree
21 harvesting.

22 Q. Right.

23 A. Well, I would want to know whether
24 these are representative figures for the very large
25 amount of precipitation chemistry that's being carried

1 out as part of the air monitoring systems over the last
2 20 years.

3 Q. I see. So that if they were --

4 A. So I want to be cautious. It may be
5 these might be quite representative or they may not be,
6 I don't know at this point.

7 Q. All right. And if they are found to
8 be representative--

9 A. Yes.

10 Q. --would that change your view?

11 A. Well, certainly if you're looking at
12 places like Stratford and Grimsby, there is a
13 substantial input of nitrogen there.

14 Q. Let's focus on a more relevant part,
15 the area of the undertaking.

16 A. Well, I was looking at it from the
17 point of view of whether we could do what we would like
18 to happen and, that is, have sufficient coming from the
19 air in the rotation period of 80 years, say, or a
20 hundred years to adequately replace what's gone off in
21 full-tree harvesting, and my conclusion is that it
22 wouldn't.

23 Q. In terms of -- getting away from
24 replacement, but in terms of having available for a
25 tree to use, do you have a comment on that on the

1 figures here? ...Getting away from replacement and
2 focussing on the availability for use and the need of
3 the tree, would you agree that that is a different
4 concept?

5 A. Yes, there's difference, yes.

6 Q. Therefore, it may not be necessary to
7 replace the exact amount lost, a tree may not need that
8 much over the course of its lifetime to get to the next
9 rotation. Would you agree with that?

10 A. Okay. So you're asking if a tree
11 could get to the same volume and health with a
12 different nutrient supply, with a lower nutrient
13 supply, for example?

14 Q. Or maybe more.

15 A. Or more. Yes, because other factors
16 would be involved, growing season and things of this
17 kind, variation in temperature and rainfall would be
18 important.

19 Q. So replacement figures; in other
20 words, you know, matching an eye for an eye, is really
21 not the important issue, it's the question of the
22 availability for the tree and what it needs in terms of
23 nutrients; is that fair to say?

24 A. Well, nutrients are one of the
25 absolute key ingredients.

1 Q. Oh, I agree.

2 A. To build your tree.

3 Q. Yes, no question. But we're not
4 talking about whether or not they need it, we're
5 talking about the concept of replacement versus
6 availability and the tree's need over the course of its
7 rotation.

8 A. Well, if you can build your tree with
9 less simply because you've got less, I'm not sure if
10 that's a good direction to be going in. It would be
11 nice to build your tree with the same amount.

12 Q. But you may not need the same amount
13 if you have these inputs; correct?

14 A. I have seen very little evidence
15 that, you know, in the next generation you can build
16 the size of trees that we have in the first generation
17 with less nutrients.

18 Q. Well, let's go back.

19 A. And that's just most unlikely.
20 Indeed in this article here on page 8, I don't suppose
21 you want me to introduce this, but it's your article.

22 Q. Go ahead.

23 A. Dr. Methven and Carlisle already
24 really sort of emphasize this, page 8, that's in the
25 discussion under the paragraph saying -- right-hand

1 side, Understanding the Effects of Whole-tree
2 Harvesting, it says:

3 "Until we know..."

4 Q. Sorry, which side?

5 A. If you count through the pages it's
6 in the discussion in the article by Carlisle and
7 Methven, on the right-hand side of that discussion page
8 which I number page 8, if I counted it right, the
9 paragraph right in the middle says, Understanding the
10 Effects of Whole-tree Harvesting.

11 And if you looks two thirds of the way
12 down that it says:

13 "Until we know more, we should rely on
14 the basic principles of good resource
15 management, so often ignored, that if
16 more is taken out of the system than is
17 returned this is bad stewardship. Any
18 nutrient deficit should be regarded as a
19 management failure quite regardless of
20 magnitude."

21 Well, that doesn't seem to be in the
22 direction you've just been leading me.

23 Q. Do you have a problem with that?

24 A. No, I have no problem with that.

25 Q. No, what I'm talking about, sir, is

1 nutrient inputs and I want to ask you - and I'll come
2 back to it because I'm not sure that I got a clear
3 answer - is it whistling in the wind to discount --
4 to consider any of these nutrient inputs through
5 precipitation on Table 4, is it whistling in the wind
6 to consider that much nitrogen per year per hectare?

7 A. You mean -- okay, if we go back to
8 it --

9 Q. Simple question.

10 A. If we take the Lake Superior, would
11 that be sufficient nitrogen for your -- well, in the
12 early stages, having done your clearcutting you have
13 lost your organic biomass and the organic biomass is
14 one of the key places where the nitrogen is held in
15 store. If you haven't got it, the nitrogen that's
16 delivered will go into your watershed.

17 Q. So there's no nitrogen in the mineral
18 soil; is that what you're saying?

19 A. No, I'm saying that if we superimpose
20 these figures on full-tree harvesting and full-tree
21 harvesting - we might all even be able to agree -
22 removes substantial extra biomass from the site.

23 You've now got less organic matter on
24 site, you don't have slash. That being the case,
25 you've removed your reservoir, your potential capture

1 network for a lot of your nutrients including nitrogen.

2 So in the first years, having lost all of
3 that, you haven't got a forest floor mat there, so a
4 good deal of your nutrients coming down that way are
5 not going to be able to be retained on site, you will
6 be losing material from site into groundwater.

7 MR. MARTEL: Can I ask a question? Does
8 anyone know how much of each of these nutrients is
9 required to get the first harvest, how much is removed
10 with the removal of the full-tree and how much is
11 required for the next tree to reach the same level as
12 the original tree taken off the site?

13 I mean, I can't figure this quite
14 practically out of what is going on, and how much we're
15 taking out, because I don't hear any figures on the
16 amount that's required to produce a tree, how much is
17 removed or how much is required to produce the next
18 tree, and I am just -- quite frankly, I'm whistling in
19 the dark because I don't know what's going on.

20 MR. CASSIDY: Well, I'm not going to give
21 evidence but I can repeat what I think Dr. Hutchinson
22 said is that he's not aware of - and you correct me if
23 I'm wrong, Dr. Hutchinson - I'm not aware -- or he's
24 not aware of studies and he's not done any studies of
25 that nature in terms of required from someone having

1 gone through a second rotation to actually study it.

2 Is that fair, Dr. Hutchinson?

3 MR. MARTEL: Let me intervene, because I
4 can't recall - and maybe it's too long ago - at any
5 stage where we have received from anyone, and I could
6 be wrong, what it requires to get the tree to the level
7 it reached before we harvested it the first time
8 around, of each of these ingredients.

9 I mean, you want people to make a
10 decision and I don't know if we have received this
11 information. I can't recall receiving how much was
12 required to get a tree that size - let me use that as
13 just a figure - and how much was removed and how much
14 it's going to take to get it back to that size.

15 And maybe I missed it, you know, there
16 has been a little bit more volume of material here than
17 might be necessary, and I might have missed it in the
18 process, but I tell you --

19 MR. CASSIDY: I'm sure you'll hear about
20 it in terms of --.

21 MR. MARTEL: I'm sure, but I'm trying to
22 understand it now.

23 THE WITNESS: Can I comment on it. I
24 mean, I think it is one of the great puzzles we have at
25 the moment or the great problems to tabulate exactly

1 what we need per generation to build a tree.

2 We can talk about how much is in the tree
3 right now and we can see, and we have provided figures
4 in our own witness statements how much is lost from
5 full-tree harvest versus conventional, and it's clearly
6 substantially more.

7 The big issue that no doubt the industry
8 wishes to argue with us about is whether that
9 substantial loss is sufficient to reduce your ability
10 to build another tree, and one way to look at it is to
11 look at the limiting factors, what nutrient is in
12 supply which is limiting that will limit the growth of
13 the tree, and generally in the boreal it is nitrogen.
14 So it's very relevant that Mr. Cassidy has raised these
15 nitrogen budgets.

16 MR. CASSIDY: Thank you. Well, let's
17 move on to nitrogen then.

18 MS. SWENARCHUK: Excuse me, excuse me.

19 MADAM CHAIR: Ms. Swenarchuk?

20 MS. SWENARCHUK: I would like the witness
21 to have the opportunity to respond to the extent he
22 wishes and feels capable to the questions that Mr.
23 Martel raised.

24 Does anyone know how much of these
25 nutrients is required to get the first harvest, how

1 much is removed by full-tree, and how much is needed
2 for the next rotation. If you would like to go on and
3 comment on that.

4 THE WITNESS: I commented on that in the
5 witness statement, yes, but Mr. Martel's got the
6 witness statement.

7 MS. SWENARCHUK: Well, I think he's
8 asking for perhaps some more clarification.

9 MADAM CHAIR: The clarification --

10 THE WITNESS: Some of the data --

11 MADAM CHAIR: Excuse me, Dr. Hutchinson.

12 MR. CASSIDY: One at a time.

13 MADAM CHAIR: The clarification you've
14 given us so far has to do with the data that you have
15 relevant to a site.

16 THE WITNESS: Yes.

17 MADAM CHAIR: And the nutrient depletion
18 accruing to a site. I think Mr. Martel had asked
19 specifically, do we know anything about -- with respect
20 to species and tree size and merchantable wood, do we
21 know anything with respect to the nutrient demand very
22 specifically in that sense?

23 THE WITNESS: There is literature on
24 this. I don't think that's a very helpful answer, but
25 people have looked at that and no doubt it may be in

1 the future and maybe already some of that literature
2 has been introduced to say what the nutrient demands
3 are for different species at different stages of growth
4 and some of that exists.

5 My evidence is that if we're removing
6 substantial portions of some nutrients which are not
7 replaced in the next cycle, such as nitrogen or
8 phosphorus, then it's logical that the tree will have
9 to grow longer and allow longer replacement time to
10 reach the same size or it may not be able to -- or it
11 may be so limited it may not be able to grow adequately
12 to reach maturity.

13 MR. CASSIDY: Q. I would like to move on
14 to--

15 MADAM CHAIR: Go ahead, Mr. Cassidy.

16 MR. CASSIDY: Q. --to deal with the
17 issue in respect of nitrogen, just because we got into
18 it there, Dr. Hutchinson, just briefly. Excuse me.

19 You stated on Monday, October 1st in
20 Volume 240, and I think you basically reiterated again
21 today that -- and I'm quoting you:

22 "If for whatever reason you lose your
23 organic matter from the soil completely,
24 which I suppose can happen, then you
25 would have effectively lost almost all of

1 - your nitrogen and that would
2 automatically become the No. 1 limiting
3 factor."

4 And you went on to say that this
5 reservoir in the organic matter is very important. You
6 were discussing this with Ms. Swenarchuk in direct
7 examination.

8 MS. SWENARCHUK: Can I have the
9 reference, please?

10 MR. CASSIDY: If I could just have a
11 minute.

12 MS. SWENARCHUK: Could I have the
13 reference?

14 MR. CASSIDY: Q. Is it your evidence
15 that nitrogen is only found in the organic layer of
16 soil?

17 A. No, you will get a certain -- there
18 will be some organic matter in many soils which will be
19 infiltrated into mineral, so...

20 Q. There will be some nitrogen you mean?

21 A. Yes, there will be some nitrogen with
22 organic in the mineral soil and you will get some small
23 amount of nitrogen down in your mineral soil even in
24 the absence of organic matter.

25 Q. I see.

1 A. In the absence of organic matter.

2 Q. So there is nitrogen in the mineral
3 soil; is that correct?

4 A. A small quantity.

5 Q. A small quantity.

6 A. Yes.

7 Q. Just explain something to me, typical
8 soil has an organic layer and then below that there is
9 a mineral soil layer?

10 A. Yes.

11 Q. Is that the basic principle?

12 A. Yes.

13 Q. All right. And your evidence is that
14 there's a small quantity of nitrogen in the mineral
15 soil below the organic matter?

16 A. Yes.

17 Q. Now, your evidence was that if you
18 remove the organic matter you're in trouble, but there
19 is still nitrogen in small quantities below that in the
20 mineral soil; is that correct?

21 A. Yes.

22 Q. All right. If I could just have a
23 minute. Okay.

24 We may have to go to the source book,
25 Madam Chair, but that was hasty. I would like to refer

1 you, Dr. Hutchinson, to the Freedman article that you
2 have in your source book which is tab--

3 A. Okay.

4 Q. --which is my Tab 6. That would be
5 near the front, Madam Chair, of the witness statement,
6 source book for Panel 1A -- Panel 1, I should say.

7 MS. SWENARCHUK: This is Freedman, Morash
8 and Hanson?

9 MR. CASSIDY: Correct.

10 MS. SWENARCHUK: Freedman, Morash and
11 Hanson.

12 THE WITNESS: All right.

13 MR. CASSIDY: Q. And if -- do you have
14 that?

15 A. Yes.

16 Q. Can I refer you to Table 3 which is
17 on page 252. If we can look at Table 3 in this article
18 it talks about nutrient pools in soils and it has
19 nitrogen listed there. Do you see that?

20 A. Yes.

21 Q. And it has three -- I'm sorry, two
22 categories, in the forest floor and mineral soil. And
23 the forest floor would be the organic layer including
24 the mat; would you agree with that?

25 A. Yes.

1 Q. And then you have the mineral soil?

2 A. Mm-hmm.

3 Q. And then you have under the figures
4 there for forest floor in what is the second column in
5 from the left, you have in the forest floor -- can you
6 read those figures to me, 900 plus or minus 110 in the
7 forest floor; that's kilograms per hectare?

8 A. Yes.

9 Q. And the mineral soil we have 3,860
10 plus or minus 720 for a total of 4,760 plus or minus
11 710.

12 Now, by my reading of that there is more
13 nitrogen in the mineral soil than in the forest floor
14 and yet you just told me that there is only a small
15 amount in the mineral soil. Can you explain the
16 discrepancy there?

17 A. I would need to see how Freedman has
18 defined his soil types, and I did say that you very
19 frequently have organic infiltrated into your mineral,
20 so it's a question of preponderance of types.

21 Now, I will just look at his methods and
22 see how he defines it, if that's okay.

23 Q. This is a document that you referred
24 to; right?

25 A. Mm-hmm. Right. His mineral soil is

1 defined as beneath the litter duff humus layer and it's
2 to a depth of 40 centimetres, to the depth of rooting
3 of his trees.

4 Q. Yes.

5 A. And so by definition, since he's got
6 trees rooting there, there's organic matter in his
7 mineral.

8 Q. I see. So that there is very much a
9 concern which you have properly defined, forest floor
10 organic layer versus mineral soil? That's something
11 that one has to do; right, to understand any discussion
12 on --

13 A. Yes, to just --

14 Q. Just hear me out, sir.

15 A. I'm sorry.

16 Q. I'm almost finished.

17 A. Okay, I'm sorry.

18 Q. That's something that someone has to
19 do in order to understand any discussion about removing
20 stuff from organic layer or removing the organic layer
21 or what is available in the mineral soil, you have to
22 understand the definition first; is that correct?

23 A. Yes.

24 Q. So that when you talk about losing
25 the organic layer it may very well be, depending on

1 what you would consider to be the mineral soil, a
2 significant amount left in the mineral soil of
3 nitrogen?

4 A. Well, I guess that's possible, but it
5 depends -- well, as you've just pointed out, it depends
6 on your definition.

7 Q. Right. Thank you. Now, let's turn
8 to -- well, it's five to twelve, Madam Chair. I'm
9 turning to another article. I'm prepared to do it for
10 five minutes, but I suspect you may want to start fresh
11 with another article at 1:30.

12 MADAM CHAIR: That's a good suggestion.
13 Let's break for lunch, Mr. Cassidy.

14 MR. CASSIDY: Thank you.

15 MADAM CHAIR: We'll be back at 1:30.

16 ---Luncheon recess taken at 11:55 a.m.

17 ---On resuming at 1:35 p.m.

18 MADAM CHAIR: Please be seated.

19 Mr. Cassidy?

20 MR. CASSIDY: Thank you, Madam Chair, Mr.
21 Martel.

22 Q. I just have a few more questions in
23 respect of the Quetico, Woods and Day study which is
24 referred to on page 7 of witness statement 1A, Dr.
25 Hutchinson, Exhibit 1405A.

1 Are you aware that Quetico Provincial
2 Park is not considered to be within the boreal forest
3 but rather is considered to be part of the Great
4 Lakes/St. Lawrence Forest region?

5 A. Yes.

6 Q. Now, I would like to refer to the
7 exhibit which you entered in evidence last Monday or
8 Tuesday, Exhibit 1409, which is the Maliondo and
9 Mahendrappa paper. It's that one, Madam Chair.

10 MADAM CHAIR: Thank you, Mr. Cassidy.

11 MR. CASSIDY: Q. And going back to Table
12 6 on that paper, which is found at page 14, where it
13 deals with distribution of nitrogen in above ground
14 tree components in the stands used for this study in
15 New Brunswick.

16 First of all, can you confirm for me that
17 Maliondo and Mahendrappa did not study the impacts of
18 timber management and specifically harvesting on these
19 sites, they simply measured the nutrients' availability
20 in the 24 sites; in other words, these weren't
21 harvested sites, these were standing sites?

22 A. Yes.

23 Q. And they simply measured the
24 nutrients in the sites; is that correct?

25 A. Yes.

1 Q. All right. They did not measure --
2 they could not, therefore, measure the impact of
3 harvesting because there was not harvesting done on
4 those sites; correct?

5 A. Right.

6 Q. Right. You in your evidence last
7 Tuesday stated in reference to Table 6 and Table 7, and
8 you stated and I'm quoting you:

9 "If we look at the one for nitrogen
10 first, Table 6, they have set it out by
11 species that have been harvested and they
12 have got the site numbers - obviously
13 many of these are site numbers - then
14 they have looked at total nitrogen in
15 above ground tree components."

16 And then you state:

17 "So the total nitrogen for the sites is
18 given in kilometres (sic) per hectare,
19 then they have looked at each of the tree
20 components, foliage, branches, moving
21 across to the right, stem wood and stem
22 bark, and they have presented this as a
23 percentage of the nitrogen total."

24 You would agree with me, would you not,
25 that this table does not include the presence of

1 nitrogen in the mineral soil; that is, the below ground
2 nutrients?

3 A. That's correct, yes.

4 Q. And, therefore, this table does not
5 present the total of all nitrogen at the site?

6 A. No, it's the distribution of nitrogen
7 in the tree.

8 Q. In the above ground components?

9 A. Yes.

10 Q. But if one were to consider the site,
11 one would consider both the above ground -- the totals
12 of the site, one would consider both the above ground
13 and below ground; that is, the nitrogen available in
14 the mineral sole and organic layer; correct?

15 A. If that is what you wanted to do,
16 yes.

17 Q. Yes.

18 A. Yeah.

19 Q. But when you were talking, when you
20 said:

21 "So the total nitrogen for the sites is
22 given in kilometres (sic) per
23 hectare...", and again I'm quoting you,
24 you were referring to the total nitrogen for the sites
25 above ground and you were not including below ground;

1 is that correct?

2 A. Yes, that was my understanding of
3 this article. Perhaps I should check it.

4 Q. Fine.

5 MR. CASSIDY: I might have said
6 kilograms, I meant kilograms. Thank God for Mr.
7 Shibatani.

8 MR. CASSIDY: You'll have your turn, Mr.
9 Freidin.

10 THE WITNESS: Yes, this seems to be
11 entirely concerned with above ground nitrogen, yes.

12 MR. CASSIDY: Q. Right. So when you
13 were giving the evidence toward the Board in that, you
14 were not, I'm sure, intending to lead them to believe
15 that this was the total nitrogen for the site, it was
16 the only total above ground nitrogen available for the
17 site; is that correct?

18 A. I certainly hope I didn't mislead the
19 Board.

20 Q. I hope not too. So that when you
21 made the following comment, where you said:

22 "If we are whole-treeing black spruce,
23 white spruce, balsam fir, down to jack
24 pine for nitrogen, at least in the New
25 Brunswick stands, we are taking away with

1 the foliage alone, never mind the
2 branches, more than 40 per cent of the
3 nitrogen and we are taking away...", and
4 then you get into a discussion on phosphorus, in excess
5 of 40 per cent.

6 As a result you are not suggesting; are
7 you, Dr. Hutchinson, that you in fact are taking away
8 40 per cent of the total nitrogen on the site?

9 A. No.

10 Q. You're only talking about 40 per cent
11 of the above ground?

12 A. Yes.

13 Q. And to be fair to us and to you, to
14 get an understanding of the total impact of full-tree
15 harvesting, you would have had to have included the
16 below ground nutrients available; is that correct?

17 A. That's right, yes.

18 Q. But you didn't do that in your
19 evidence; did you?

20 A. No. A lot of the evidence that has
21 been presented by various authors has dealt with
22 percentage additional nitrogen and whatever that's
23 taken away as a result of full-tree harvesting combined
24 with conventional, and that is really the way these
25 people are looking at it.

1 Q. Right. Okay. Now, in respect of
2 page 21 of witness statement 1 which is Exhibit 1405A,
3 we have the following statement --

4 MADAM CHAIR: What page number, Mr.
5 Cassidy?

6 MR. CASSIDY: 21.

7 MADAM CHAIR: Thank you.

8 MR. CASSIDY: 1405A, panel witness
9 statement No. 1.

10 Q. Do you have that, Dr. Hutchinson?

11 A. Yes.

12 Q. On page 21 you state, in the second
13 paragraph:

14 "Most studies did not consider those
15 trace or macronutrients (sic) which are
16 equally essential for maintenance and
17 growth. These include maganese,
18 boron...", et cetera. You state:

19 "I have a serious concern based on our
20 own studies and on discussions with
21 colleagues in forest ecology and
22 nutrition in Germany...", et cetera,
23 "...that we can readily and almost
24 inadvertently cause growth limiting
25 micronutrient deficiencies of such

1 elements as zinc...", et cetera.

2 Now, the Ontario Federation of Anglers &
3 Hunters asked you an interrogatory about that sentence
4 where you state your serious concern, and that can be
5 found in Exhibit 1418, Madam Chair and Mr. Martel, and
6 you can find that on the 6th page of that. It's not
7 numbered at the top, it is the 6th page.

8 MADAM CHAIR: Is that OFAH Interrogatory
9 17?

10 MR. CASSIDY: Correct.

11 Q. Do you have that, Dr. Hutchinson?

12 A. Yes.

13 Q. And you were asked to provide the
14 full citation for the words, "our own studies", and
15 have the originals included with the reference term on
16 file with the Board.

17 And your answer on this:

18 "My own studies can be traced via reports
19 to MOE on forest decline and mycorrhizal
20 responses, and the M.Sc...", which I take
21 it is Masters of Science,

22 "...thesis of M. Egyed available from the
23 University of Toronto library."

24 That's Marika Egyed?

25 A. Yes.

1 Q. You were in fact the thesis
2 supervisor for that thesis; were you not?

3 A. Yes.

4 Q. And that has just been published; has
5 it not, this year?

6 A. Yes.

7 Q. Now, we asked you; that is, my
8 clients, the OFIA and OLMA asked you the same question
9 and it can be found in Exhibit 1418 on the very first
10 page, Question 4, to provide a copy of those studies,
11 and you indicated in that one that the information was
12 from personal communications from Tam and Anderson to
13 Dr. Hutchinson.

14 Why didn't you mention the Egyed thesis
15 in the response to my client and you did mention it in
16 response to the Anglers & Hunters?

17 A. Well, I have a serious concern based
18 on our own studies and discussion with colleagues...
19 Okay. Now, that's a good question.

20 Q. I thought so.

21 A. Yes. It looks like between the two
22 answers I have sort of answered the whole thing in
23 completion, but in neither of them have I given a total
24 answer.

25 Q. So you're assuming that everybody has

1 to read everybody else's answers?

2 A. Well, I'm sorry I didn't assume that,
3 but that was carelessness I think.

4 Q. All right. Well, let's move away
5 from your carelessness now and look at that thesis.

6 A. Okay.

7 Q. I had to borrow this thesis from the
8 University of Toronto library and it's due back on
9 Friday. But what I'm going to ask you to undertake to
10 do, if you can promise me you'll return it to me by
11 Friday, is to review this thesis and tell me -- first
12 of all I'm going to read the thesis into the record and
13 it cannot be made an exhibit because this is a library
14 book. It's called Sugar Maple Decline in Ontario, the
15 Role of Nutritional Imbalances and Fine Roots by Marika
16 Egyed.

17 MS. SWENARCHUK: The Role of...?

18 MR. CASSIDY: The Role of Nutritional
19 Imbalances and Fine Roots, and I'm going to give this
20 to you and ask you to review it and, if you can return
21 the book to me on Friday - I'm not looking for an
22 answer on Friday because we're not sitting, but we will
23 be sitting next Monday - if you can provide me with an
24 answer to your undertaking and the undertaking I would
25 ask you to give is to review this thesis and point to

1 me references where any decline in Ontario of sugar
2 maple is attributed to any timber management activity.
3 And so if you can do that --

4 A. Well, I will get an answer to that
5 right now. It's to do with forest decline, sugar maple
6 decline that thesis.

7 Q. I'm sorry?

8 A. It's to do with forest decline, the
9 decline of sugar maple and it's a thesis which is based
10 on root studies at a number of sites in the province.
11 They're in the Dorcet/Sundridge area and they examined
12 the mycorrhizal health of the sugar maple correlated
13 against the soil chemistry and correlated against the
14 decline indices of the sugar maple.

15 So it's really asking if there's
16 correlations between the health of the root systems,
17 the chemistry of the root systems, and the decline
18 index.

19 Q. Great. And will you still give me
20 the undertaking for which I asked?

21 A. Well, if you wish.

22 Q. Thank you.

23 MS. SWENARCHUK: Madam Chair, I just want
24 to clarify for the record that the paragraph from page
25 21 that Mr. Cassidy was reading refers to

1 micronutrients rather than, I think he said
2 macronutrients.

3 MR. CASSIDY: Thank you, Ms. Swenarchuk.

4 Q. Do you understand the undertaking,
5 sir?

6 A. I'm not sure if I do in context with
7 this. Perhaps you could explain it.

8 MS. SWENARCHUK: Would you repeat it,
9 please?

10 MR. CASSIDY: I would like the witness to
11 review this thesis and point me - and I may have
12 questions on this in cross-examination subsequent,
13 depending what the answer is - point me to any
14 statement or any part of that thesis in which he
15 believes the thesis deals with the sugar maple decline
16 being attributed to a timber management activity, that
17 being for your information, Dr. Hutchinson, access,
18 harvest, renewal and maintenance.

19 A. Right.

20 Q. Do you understand now?

21 A. Yes. So that doesn't follow from
22 this paragraph, it's just what you want me to do.

23 Q. That's what I'm asking you to do.

24 All right.

25 A. Yeah.

1 Q. Thank you.

2 A. So just to make sure I'm absolutely
3 clear, it doesn't in any sense follow from this
4 paragraph because they haven't said anything about
5 timber management in it.

6 Q. I understand that, sir, and I'm
7 looking to find what there is in that document about
8 the issue and the topic I have just asked you to do.
9 And if you could come with an answer on Monday, we will
10 go from there.

11 MS. SWENARCHUK: And I wrote down exactly
12 what you said and I just want to ask for your
13 agreement, but I will write that out and give that
14 statement to him to take with him.

15 MR. CASSIDY: Well, why don't you read
16 back what you wrote.

17 MS. SWENARCHUK: He's to review it and
18 point you to any statement or part of the thesis in
19 which the thesis deals with sugar maple decline being
20 attributed to timber management activity.

21 MR. CASSIDY: Or caused by.

22 THE WITNESS: And timber management
23 doesn't include tapping of sugar maple trees?

24 MR. CASSIDY: No, it doesn't.

25 THE WITNESS: Okay.

1 MR. CASSIDY: I think I indicated what
2 they were for your information.

3 THE WITNESS: Right.

4 MS. SWENARCHUK: I will add that to the
5 list; access, harvest, renewal and tending.

6 MR. CASSIDY: In the context, Ms.
7 Swenarchuk, in which we have been dealing with them in
8 the hearing.

9 MS. SWENARCHUK: I'll just give him the
10 list.

11 MR. CASSIDY: That's fine.

12 MR. CASSIDY: Now, I have to have that
13 back by Friday or the else the U of T library is going
14 to get very mad at Mr. Shibatani.

15 MADAM CHAIR: That's tomorrow, Mr.
16 Castrilli. THE WITNESS: That's tomorrow.

17 MR. CASSIDY: Well, since you're the
18 thesis supervisor and able to describe what it is, I'm
19 going to ask you to review that overnight and get it
20 back to us by five o'clock tomorrow.

21 THE WITNESS: Which library did you get
22 it from?

23 MR. CASSIDY: The U of T library.

24 THE WITNESS: The central one?

25 MR. CASSIDY: Yes. It might be worth

1 while, and I hate to take up time with this, but this
2 is a document I don't want to get lost. If you need
3 for the time, we will arrange to renew it, but if you
4 at least have it back in our hands by five o'clock
5 tomorrow I'd appreciate it.

6 We will call and we'll have someone pick
7 it up, if that's a difficulty.

8 MS. SWENARCHUK: Do you have a copy, Dr.
9 Hutchinson?

10 THE WITNESS: Well, this must be an
11 incredibly popular thesis. I tried to get ahold of one
12 last night, the departmental copy is gone, somebody has
13 borrowed my copy and I was glad to see you managed to
14 get one.

15 MR. CASSIDY: So was I.

16 THE WITNESS: Right now I don't actually,
17 I would like to hang on to this one. The only thing is
18 I'm not in town tomorrow and might also --

19 MADAM CHAIR: Maybe Dr. Hutchinson can
20 arrange with the library to hold it over the weekend.

21 MR. CASSIDY: Are you happy with that,
22 Mr. Shibatani?

23 MS. SWENARCHUK: Well, what he's just
24 told you is that he can't do it between now and five
25 o'clock tomorrow.

1 MR. CASSIDY: All right. If you can make
2 arrangements to renew it and come in on Monday with it.

3 THE WITNESS: Could I ask if FFT could
4 arrange to have it renewed because I won't be around.

5 MS. SWENARCHUK: Give it to us and we'll
6 take care of it tomorrow and then give it to him over
7 the weekend.

8 MR. CASSIDY: Well, okay, I'll have Mr.
9 Shibatani do that then and get it to you. Thanks.

10 Thank you, Madam Chair, for your
11 indulgence and time.

12 Q. All right. Now, coming back to the
13 Maliondo and Mahendrappa paper, Exhibit - Maliondo and
14 Mahendrappa, Mr. Martel - Exhibit 1409. The study, Dr.
15 Hutchinson, deals with possible implications of
16 whole-tree harvesting. Do you see that in the title?

17 A. Yes.

18 Q. These are very careful scientists;
19 aren't they?

20 A. Well, I imagine so, yes.

21 Q. So if they wanted to use the word
22 'implications' or a more definite word, they would have
23 used a more definite word than possible?

24 A. Yes.

25 Q. Are you prepared to assume that?

1 A. Yes.

2 Q. Thank you. Now, I just want to
3 finish, Madam Chair, with just a couple of questions.
4 I know you're not an expert in compaction, Dr.
5 Hutchinson, but you made a statement in respect of
6 compaction in response to a question from Ms.
7 Swenarchuk and you made this statement last Tuesday.
8 Volume 241, where you were referred to an
9 interrogatory -- well, I'm sorry, let me back up.

10 You were referred to the issue of
11 compaction by Ms. Swenarchuk and you stated, and I'm
12 going to quote you:

13 "I read somewhere that high flotation
14 tires were used on some of the equipment
15 but, if I recollect correctly, I think
16 the use of this amounts to something like
17 15 per cent of the use in the province;
18 that is, the equipment was 15 per cent
19 was equipped with high flotation tires."

20 And then you made the following
21 statement:

22 "That being the case, there is 85 per
23 cent not fit with high flotation tires."

24 Now, I think you were corrected by Ms.
25 Swenarchuk the following the time you were before the

1 Board and you indicated that that 15 per cent was use
2 in the clay belt and you were in error with respect to
3 in the province, and your counsel has provided me with
4 a copy of an interrogatory No. 17 that Forests for
5 Tomorrow asked for MNR's Panel 10.

6 A. Okay.

7 Q. And I have a copy of that for you.
8 Do you have it?

9 A. Question 17.

10 Q. Yes.

11 A. Yes.

12 Q. And the statement in that
13 interrogatory is that, when you were asked by -- I'm
14 sorry, when MNR was asked by your clients:

15 "In what proportion of the harvested area
16 in the clay belt are...", and that's
17 harvesting techniques, modified harvesting techniques

18 "In what proportion of the harvested
19 area in the clay belt are they
20 utilized?"

21 The answer was that:

22 "These techniques are not required on all
23 clay belt sites but only on the low lying
24 sites. The same end result is also
25 achieved in some areas by ensuring that

1 these sites are only logged in winter."

2 And then the answer from MNR goes on to

3 state that:

4 "In 1986-1987, approximately 15 per cent

5 of the clay belt harvest area was

6 regenerated by these modified

7 operations."

8 And that's where you got your 15 per cent

9 figure from; is that correct?

10 A. Yes.

11 Q. I'm interested in your comment about

12 that being the case, there's 85 per cent not fit with

13 high flotation tires. Is it your evidence that even

14 within the region such as the clay belt there has to be

15 one hundred per cent of the modified, of the operations

16 using high flotation tires?

17 A. No.

18 Q. So that there is some percentage out

19 there that requires it, but it really is a

20 site-specific feature; is it not?

21 A. Right.

22 Q. And then, the question of 85 per cent

23 not fit with high flotation tires does not take into

24 account that site variability that you just mentioned

25 and that you've mentioned earlier; is that correct?

1 A. Yes.

2 Q. So in fact that 85 per cent figure is
3 irrelevant; is it not?

4 A. Well, it had a relevance to the 15
5 per cent here.

6 Q. But other than that--

7 A. Other than that--

8 Q. --it ignores a pretty crucial item
9 called site variability; is that correct?

10 A. Mm-hmm.

11 Q. Okay.

12 MR. CASSIDY: If I could just have a
13 minute, Madam Chair.

14 MR. FREIDIN: If you are finished, that's
15 the shortest two hours I have ever seen, Mr. Cassidy.

16 MADAM CHAIR: Are you going to be ready
17 to follow Ms. Seaborn, Mr. Freidin?

18 MR. FREIDIN: Yes.

19 MR. CASSIDY: Madam Chair, I have no
20 further questions, however, I do wish to inform you of
21 something. The cross-examination -- I'm sorry, the
22 examination-in-chief of this witness included questions
23 which were addressed to this witness about what's been
24 now known as the Nicks study, and that is Exhibit 1165
25 I believe, and I've had a chance to review the

1 transcripts in respect of that in more detail and, in
2 particular, I've had a chance to - 1156 is that
3 exhibit - in particular, I've had an opportunity to
4 review the cross-examination of Mr. Nicks by Ms.
5 Swenarchuk, and I don't intend to get into a legal
6 argument about this today, suffice it to say that it is
7 my position that the cross-examination by Ms.
8 Swenarchuk did not raise, notwithstanding she had the
9 document provided to her, did not raise many of the
10 issues to which this witness was then asked to comment
11 on with respect to the Nicks report.

12 That leaves us in the position as a
13 result of that of Mr. Nicks not being able to have had
14 the opportunity to respond to some of the criticisms of
15 his report that were made by this witness and by
16 Forests for Tomorrow in their examination-in-chief and
17 at the appropriate time I'm simply advising you that we
18 reserve our right to request a right of reply to that
19 to address what we believe is a situation where Mr.
20 Nicks should have been given the opportunity to respond
21 to those criticisms.

22 And, as I say, I don't intend to get into
23 an argument about that now because it is in many
24 respects a legal argument and we will have to wait and
25 see how the case unfolds, if we even need to make that

1 argument, but at the appropriate time we may and I wish
2 to advise you of that.

3 And as a result, that concludes my
4 cross-examination and if I'm to be criticized for being
5 early, it's criticism I'm happily pleading guilty to.

6 MADAM CHAIR: Thank you, Mr. Cassidy.

7 MR. MARTEL: You don't hear us objecting.

8 MADAM CHAIR: Ms. Seaborn?

9 MS. SEABORN: Thank you, Madam Chairman.

10 Good afternoon, Madam Chair, Mr. Martel.

11 I would like to introduce for the Board's benefit my
12 assistant here Mr. Bernie Neary. Mr. Neary is a water
13 quality scientist with the Ministry of Environment and
14 is stationed in Dorcet, Ontario and I'm fortunate to
15 have him here to assist me.

16 I would like to begin by filing
17 interrogatories that were posed to Forests for Tomorrow
18 by the Ministry of the Environment in relation to Panel
19 1, and I'll be filing Questions 1 through 6, and if
20 that package could have the next exhibit number, Madam
21 Chair.

22 MADAM CHAIR: That is Exhibit 1424.

23 ---EXHIBIT NO. 1424: MOE Interrogatory Question Nos.
24 1-6 and response by FFT, Panel
No. 1.

25 MS. SEABORN: Thank you.

1 MS. SWENARCHUK: Who gives the party at
2 Exhibit 1500?

3 MR. CASSIDY: MOE.

4 MS. SEABORN: Madam Chair, just by way of
5 introduction, my questions this afternoon won't be very
6 long. We have reviewed in particular Forests for
7 Tomorrow's Panel 3 witness statement presented which
8 Mr. Merrick is going to give evidence in relation to.
9 There are a number of issues that are raised from an
10 ecological point of view in this witness statement
11 that, in our view, are raised again more on an
12 operational level in Panel 3, and so there are a number
13 of matters that we will be addressing in more detail in
14 Panel 3.

15 CROSS-EXAMINATION BY MS. SEABORN:

16 Q. Dr. Hutchinson, I would like to begin
17 by dealing with your evidence as it relates to the
18 effects of full-tree harvesting on site productivity
19 and, in particular, could you turn to page 15 of your
20 Panel 1 witness statement, which is Exhibit 1405A.

21 Now, at the bottom of page 15 you quote
22 from Maliondo, 1988 and list three -- what you
23 characterize as three potentially deleterious effects.
24 They are: No. A, the loss of organic matter; No. B,
25 the loss of nutrients; and C, the occurrence of soil

1 and site acidification.

2 And if I can try and summarize my
3 understanding of your evidence, and I would like to get
4 your agreement or disagreement with me, is what you're
5 telling the Board is that when you full-tree harvest
6 and you're removing the crown components from the site,
7 the result will be a loss of organic matter, a loss of
8 nutrients and the occurrence of soil and site
9 acidification. Is that a fair summary of your
10 position?

11 A. Yes, yes. The soil and site
12 acidification, there may be some variation on that, but
13 the first two would be absolute.

14 Q. Okay. And, in your opinion, these
15 are negative effects that would not be as significant
16 if conventional or bole-only logging methods are used;
17 is that correct?

18 A. That's correct, yes.

19 Q. So it's a degree, it's relative when
20 we're comparing full-tree harvest versus conventional
21 harvest methods. You're putting forward your position
22 to the Board in terms of relative negative effects?

23 A. Yes. It's seems to be an unfortunate
24 fact that bole-only removes a rather small pool of your
25 nutrients; whereas, if you go to full-tree harvesting,

1 there's a substantial step up, especially with respect
2 to nutrients but also of course with biomass.

3 Q. And is it fair to say then that what
4 you're looking at in terms of what you characterize in
5 your opinion as a negative effect, you're comparing the
6 bole-only harvest versus full-tree harvest methods?

7 A. That's right.

8 Q. Okay. And just so I'm clear on
9 exactly the negative effect that causes you concern in
10 relation to organic losses, am I correct that your
11 concern is that reductions of soil organic matter may
12 lead to lower forest site productivity?

13 A. Yes.

14 Q. And with respect to the loss of
15 nutrients, again you have a similar concern; that is,
16 that a larger proportion of the nutrients will be taken
17 off site when crown canopy is removed?

18 A. Yes, and that the consequence of that
19 will be either you're forced into a longer rotation or
20 if you want for the same rotation you would have
21 smaller biomass for harvesting.

22 Q. Okay. And with respect to site
23 acidification, is it your position that sites that are
24 full-tree harvested lack protection due to the removal
25 of the base rich crown components which would otherwise

1 help buffer a site?

2 A. Yes. A good proportion of your
3 overall calcium, magnesium, potassium is in your crown.

4 Q. Yes.

5 A. So that if that's put onto the ground
6 in terms of slash or natural leaf fall, it's there for
7 neutralizing purposes; if it's taken off site, then you
8 lack that neutralizing ability.

9 Q. Okay. And if it's taken off site,
10 then it's not otherwise available to buffer a site from
11 the effects of an atmospheric acid input; is that
12 correct?

13 A. That's right.

14 Q. Now, Dr. Hutchinson, these three
15 major effects of full-tree harvest that we have been
16 talking about, organic losses, nutrients and soil and
17 site acidification, I take it from my review of your
18 evidence that these are not only negative effects but
19 they're long-term effects; is that correct?

20 A. Well, the biomass -- let me think
21 about that. Yes, they're long-term effects if we
22 define term as the next rotation.

23 Q. Okay.

24 A. If we take a much longer time scale
25 than that, then there would be gradual replenishment of

1 the nutrients, but we would probably have gone away
2 from sustainability.

3 Q. And would you agree with me as a
4 general proposition that forest managers should be
5 managing the land base and not just the trees that grow
6 on the land base?

7 A. Yes.

8 Q. And would you agree with me that if
9 one accepted that there are negative long-term effects
10 associated with full-tree harvest, then if we mitigated
11 these affects we would be responsibly managing the
12 lands?

13 A. Yes.

14 MADAM CHAIR: Excuse me, Dr. Hutchinson.
15 Could we just revisit a statement you made a moment
16 ago. And what I understand you saying is that the
17 nutrients, with respect to the long-term effects on
18 soil productivity--

19 THE WITNESS: Right.

20 MADAM CHAIR: --of full-tree harvesting
21 will not be replenished until after the next rotation?

22 THE WITNESS: Yes, yes.

23 MADAM CHAIR: So you believe there will
24 be no replacement at all of nutrients or an
25 insufficient replacement of nutrients?

1 THE WITNESS: Oh no, I don't mean that.
2 I mean it will be a slow process.

3 MADAM CHAIR: If you look at the source
4 as being only the biomass?

5 THE WITNESS: Well, if you look at the
6 source as -- if we include mineralization,
7 precipitation. What the trees are doing in each
8 generation is basically tapping into all of these
9 sources, but particularly into the nutrient reserve in
10 the biomass and if you take a lot of that away, then
11 you force dependency on these other sources, some of
12 which are either very low inputs per year or very slow
13 processes such as the mineralization process.

14 MADAM CHAIR: But you're saying it has to
15 be the growth of the future biomass to fully replenish
16 the site?

17 THE WITNESS: Well, I went into that
18 debate earlier with Mr. Martel as to exactly how much a
19 tree needs.

20 MADAM CHAIR: I didn't hear you make that
21 statement before though, that it would be a full
22 rotation period before site productivity would be --

23 THE WITNESS: Oh, I think I've made that
24 statement before, that the concern would be that we
25 couldn't maintain the biomass in the next generation

1 and, therefore, we would either have a longer rotation
2 to do it or we would have a smaller biomass,
3 harvestable biomass.

4 MADAM CHAIR: Go ahead, Ms. Seaborn.

5 MS. SEABORN: Q. Dr. Hutchinson, are you
6 familiar with an article that was written by Ian K.
7 Morrison, called Full-Tree Harvesting Disadvantages
8 from the Forester's Viewpoint, and just before I
9 introduce it as an exhibit, Madam Chair, I'll just show
10 it to Dr. Hutchinson and ensure that he's familiar with
11 it. (handed)

12 A. I have seen it before.

13 Q. And is this the same Dr. Morrison I
14 presume that has been referred to in earlier evidence
15 in Foster, Morrison studies?

16 A. Yes, yes.

17 MS. SEABORN: If I can make that the next
18 exhibit, Madam Chair.

19 MADAM CHAIR: All right, Ms. Seaborn,
20 that will be Exhibit No. 1425. Could you read out the
21 title and the number of pages and --

22 MS. SEABORN: Yes, I apologize. It's
23 called Full-Tree Harvesting Disadvantages from the
24 Forester's Point of View, it's from Volume 81, Pulp and
25 Paper Canada, No. 10, October, 1980, and it is 4 pages.

1 ---EXHIBIT NO. 1425: Four-page document titled:
2 Full-Tree Harvesting
3 Disadvantages from a Forester's
4 Point of View, published in
 Volume 81, Pulp and Paper Canada,
 No. 10, October 1980, authored by
 Ian K. Morrison.

5 MADAM CHAIR: Mr. Martel is going to be
6 taking a speed writing course and I'm joining him. We
7 have trouble sometimes getting the names of titles and
8 so forth down, so it doesn't hurt to go slowly and
9 repeat them.

10 MS. SEABORN: Thank you for that
11 reminder, Madam Chair.

12 Q. Now, Dr. Hutchinson, I want to put to
13 you a couple of statements that appear in this article,
14 and if you could turn to the second page of Exhibit
15 1425 and go down to the third paragraph, which is the
16 long paragraph that starts about halfway down the page.

17 A. Mm-hmm.

18 Q. And you will see the line that
19 begins:

20 "The gist of the fertility problem..."

21 A. Yes.

22 Q. And Dr. Morrison states that:

23 "The gist of the fertility problem is
24 this: With conventional harvesting, only
25 - a small portion of the nutrient capital;

1 namely, that contained in the stems is
2 removed from the site and harvest
3 products; with some of the new
4 technologies which propose to utilize the
5 full standing crop (not only stems but
6 top wood and even stumps and roots as
7 well) substantially greater quantities
8 of elements will be lost from the site.
9 If this were to happen it could mean, in
10 certain cases at least, that insufficient
11 nutrients are available for regrowth
12 stands and the result could be general
13 productivity decline."

14 Now, when I came across this article,
15 that particular paragraph struck me as being a rather
16 concise summary of your position before the Board in
17 relation to full-tree harvesting; is that fair?

18 A. That's right. He does mention roots
19 and stumps, which I didn't discuss because my
20 assumptions are out as being that we're not into
21 whole-tree harvesting in the province, but he's got
22 data there on crowns, stems and that was my concern
23 too.

24 Q. Okay. And if you turn to the last
25 page of the article on the far right-hand side where it

1 says 'abstract', the very last sentence of the
2 abstract, Morrison says:

3 "The forester is seen as the key person
4 in preserving site productivity values."

5 Now, would you agree that in terms of
6 timber management on a management unit basis that the
7 forester can play an important role in preserving site
8 productivity values?

9 A. Yes.

10 Q. And would you agree with me that one
11 of the ways that a forester can play that role is in
12 the sort of silvicultural prescriptions that he or she
13 would prescribe for a particular site?

14 A. Yes. Those comments seem to me to be
15 very much in line with that little piece that I read
16 out from the Carlisle and Methven paper this morning.

17 Q. Yes. Now, I want to deal quite
18 briefly with this topic of site acidification. Now, I
19 believe you explained in your witness statement that
20 soil and site acidification occurs naturally as a
21 result of tree growth?

22 A. Yes, it does.

23 Q. Yes. And we know that trees need
24 calcium to grow, and I think we know that calcium is
25 removed through full-tree harvesting; is that correct?

1 A. Correct.

2 Q. And trees in order to grow receive or
3 obtain calcium from the soil; is that correct?

4 A. Yes.

5 Q. Now, if you have acid depositions in
6 the form of acid rain, would you agree with me that
7 calcium is one nutrient that would help to neutralize
8 the acid?

9 A. Yes.

10 Q. And accordingly, if calcium is no
11 longer available to neutralize acids because it's been
12 removed from a site through full-tree harvesting, would
13 you agree that you have reduced the acid neutralizing
14 capacity of the site?

15 A. Yes.

16 Q. And you would get a further reduction
17 in the acid neutralizing capacity of the soil as new
18 trees grow; is that correct?

19 A. You would get a further reduction in
20 the acid -- sorry, could you just repeat.

21 Q. You would get a further reduction in
22 the acid neutralizing capacity of a site as the trees
23 grow?

24 A. Yes.

25 Q. And would you agree with me that if a

1 site receives acid depositions and has also been
2 full-tree harvested, then there would be an additive
3 effect on that site in terms of net acidification?

4 A. Yes.

5 Q. And I want to deal with the paper
6 that Mr. Cassidy introduced this morning, Red Herrings
7 in Acid Rain Research, Exhibit 1423.

8 I am not sure you need the paper, you
9 will probably remember the quote. And this was the
10 statement that Mr. Cassidy referred you to, red herring
11 number 3, and this is on page 6 of Exhibit 1423.

12 A. Page 6, okay. Oh yes.

13 Q. And red herring number 3 was that
14 acidification of lakes and streams results from changed
15 land use practices (forestry, agricultural, animal
16 husbandry) and not acid deposition.

17 A. Yes.

18 Q. Now, in terms of what we just talked
19 about a moment ago, and I think you agreed with me
20 about a site having -- there being an additive effect
21 on a site with respect to acid rain and full-tree
22 harvest. Are the answers that you gave me inconsistent
23 with the conclusion that you came to in this document,
24 Exhibit 1423?

25 A. Well, the harvest that I think we all

1 had in mind then was conventional harvest, conventional
2 bole-only harvest.

3 Q. Okay.

4 A. And so, to think about it, but if we
5 move substantially to full-tree harvest, then the
6 potential in those watersheds for that particular land
7 use causing lake and stream acidification is enhanced.

8 Q. And I just want to be clear then, are
9 you saying then that your conclusions with respect to
10 red herring number 3 would be different had you written
11 this paper in the context of full-tree harvest
12 practices?

13 A. Well, we might have picked out
14 full-tree harvest as one of those areas of concern in
15 land use which could lead to water acidification.

16 Q. Okay.

17 A. In other words, that one may not have
18 been a red herring we felt these others were.

19 Q. In the context of full-tree harvest?

20 A. Yes.

21 Q. Okay.

22 A. This was done in the early 1980s and
23 full-tree harvest, though it was beginning in North
24 America -- well, I guess it had been going for some
25 time, it was not a feature of the landscape as it is

1 now.

2 Q. Well, certainly the Board has heard
3 evidence from MNR and the Industry with respect to the
4 prevalence of full-tree harvest.

5 A. Right.

6 Q. Now, in your evidence-in-chief I
7 believe you said that most foresters will probably
8 agree on what a good site is and what a bad site is but
9 there's a gray area inbetween.

10 A. Quite a big gray area inbetween.

11 Q. Do you recall that testimony?

12 A. Yes.

13 Q. Okay. And it's really this gray area
14 inbetween that sparks the debate in relation to the
15 effects of full-tree harvest on site productivity; is
16 that fair?

17 A. Among scientists I think it does.

18 Q. Okay.

19 A. And sitting on this end of the table
20 today it seems it may.

21 Q. Okay. Well, the Board -- I guess to
22 put it --

23 A. The nutritionally poor sites may also
24 cause concern in some other quarters.

25 Q. Okay. Well, the Board has heard

1 quite a bit of evidence on this topic and there have
2 been a number of papers that have been introduced, and
3 there's clearly some disagreement among scientists as
4 to when is a sensitive site really sensitive, what is a
5 marginal site.

6 A. Mm-hmm.

7 Q. What's nutrient poor, what's nutrient
8 rich; there's a great array of opinion on this topic.

9 A. Right.

10 Q. Okay. But I think what you were
11 saying in your oral testimony last week was that you
12 could probably pin down what a good site was and you
13 could probably pin down what a poor site was, but we
14 would still have this large gray area in the middle.

15 A. Yes.

16 Q. You would have to deal with that gray
17 area in the middle.

18 A. Yes.

19 Q. Okay. Now, we asked some
20 interrogatories in relation to sites, and if you could
21 turn to Exhibit 1424 which are the Ministry of
22 Environment interrogatories that were just filed. Now,
23 Question 2, the question was:

24 "The evidence refers to 'deeper fertile
25 sites.' a) Please define further

1 what is meant by deeper fertile sites."

2 And then the response appears in the
3 first paragraph.

4 "Site fertility can be directly
5 determined by chemical analy --", or I'm
6 sorry, the answer appears in the second paragraph of
7 the answer:

8 "Deep fertile sites are such as occur
9 in parts of the clay belt with a
10 substantial clay-silt component to the
11 soil but without much waterlogging. Deep
12 sandy soils are not as fertile. Shallow
13 podzols on granite rocks are often
14 infertile."

15 A. Yes.

16 Q. Okay.

17 a. This is just giving some examples
18 of -- well, I guess one extreme would be the fertile
19 sites where we might be talking about deep clays in
20 uplands in the clay belt. There is problems of
21 fertility where you get a lot of waterlogging, even if
22 you're on clay.

23 Q. Okay.

24 A. And the other examples would be at
25 the other extreme in terms of infertile sites, would be

1 sandy sites, and shallow sites, very shallow sites on
2 primitive rocks.

3 Q. Okay. Now, in terms of fertile
4 sites, from an ecological point of view, is it your
5 position that full-tree harvest need not be restricted
6 on these deeper fertile sites?

7 A. Full-tree harvest, hmm. If we had
8 some restrictions on full -- okay, that's a difficult
9 question to answer just like that.

10 If we're trying to maintain
11 sustainability as one of the objectives of forest
12 management, then we may have concerns that even on
13 fertile sites or relatively fertile sites that
14 full-tree harvest in time would cause them to be
15 degraded in terms of nutrition, so there may be some
16 concerns there, but those concerns would not be for the
17 next generation of trees or maybe not even the next two
18 or three rotations; whereas I think if we're talking
19 about infertile sites we would have major concerns that
20 the next rotation may be the degradation of soil
21 fertility.

22 Q. Okay. I'm just trying to narrow down
23 based on your expertise this sort of gray area, and I
24 take it then that in terms of deeper fertile sites for
25 full-tree harvest, is your position then that you

1 wouldn't have concern over the next two to three
2 rotations, but--

3 A. Yes.

4 Q. --but you may have concern over the
5 longer term?

6 A. Yes.

7 Q. Okay.

8 A. If you had asked me - which you
9 didn't - if you asked me if I would have concerns about
10 conventional harvest on fertile sites, I would have no
11 concerns about conventional harvest. But trying to
12 take a long-term view over a number of rotations, I
13 think I ultimately would be concerned that we have this
14 possibility of site degradation in terms of fertility.

15 MADAM CHAIR: Excuse me, Dr. Hutchinson,
16 just so I understand clearly. Are you saying then that
17 there's a chance that with respect to site fertility,
18 and we spoke a few minutes ago about site
19 productivity--

20 THE WITNESS: Yes.

21 MADAM CHAIR: --concerning the
22 replenishment of nutrients after full-tree logging, so
23 do you think on this related topic of fertility that it
24 would be longer than one rotation age?

25 THE WITNESS: For fertile sites?

1 MADAM CHAIR: Yes.

2 THE WITNESS: Yes. We would almost -- if
3 you like, you could almost define them that way, in
4 terms of the percentage nutrients that you're taking
5 off the site relative to reserves. So that the concern
6 about full-tree harvest will be over multiple
7 rotations.

8 MADAM CHAIR: So in fact the nutrients
9 wouldn't be replenished after one rotation, there would
10 still be a deficit, a nutrient deficit for one or
11 two --

12 THE WITNESS: The ones you've taken off
13 may not be replaced in that one rotation, but there may
14 be adequate or plentiful reserves on site for that not
15 to be a problem in terms of tree nutrition.

16 MADAM CHAIR: All right.

17 MS. SEABORN: Q. Now, in MOE Question 4
18 on page 2 of Exhibit 1424, we asked for an
19 identification of the characteristics of sites that are
20 non-sustainable, and you responded that:

21 "The characteristics of non-sustainable
22 sites would vary widely across the area
23 of the undertaking. They would
24 include nutrient poor shallow sites,
25 steep sloped sites, some poorly drained

1 fragile black spruce sites."

2 A. Yes. And I probably should have
3 added in there some of the sandy sites.

4 Q. That is what I was going to ask you.

5 A. Yes.

6 Q. First of all, is there anything you
7 want to add to that list?

8 A. Shallow sites. Well, okay, shallow
9 sites, especially acidic sites on conisic rocks which
10 would be a good portion of the Pre-Cambrian Shield.
11 And shallow, I mean, obviously we would have to define
12 it. There is -- this has been looked at a lot and
13 there is one definition which is based on 30
14 centimetres and that's a reasonable one to do it on.

15 Q. So would you -- just stopping you
16 there for a moment, would you classify then a shallow
17 site as one with less than 30 centimetres?

18 A. Yes. Please don't ask me, as Mr.
19 Hanna did, to say exactly why 30 and not 31. 30 seems
20 a reasonable number from some of the published data,
21 but I would hate to be absolute about it.

22 Q. I would hate to repeat any areas that
23 Mr. Hanna has covered.

24 A. And I haven't mentioned in --
25 mentioned there some poorly drained fragile black

1 spruce sites where disturbance could be an adverse
2 factor together with lack of fertility, and some
3 nutritionally poor sandy sites, which many of the sandy
4 sites are of that type.

5 I guess it does depend -- I have to say
6 there is always other sites, it would depend what
7 you're trying to plant there to some extent. On some
8 of the sandy sites there's a regular rotation of jack
9 pine.

10 Q. Okay.

11 A. So I'm not excluding jack pine.
12 Full-tree harvesting of jack pine on sandy sites may
13 also create some problems.

14 Q. Would you agree that there could be
15 some nutrient poor sites in the clay belt, nutrient
16 poor black spruce sites in the clay belt?

17 A. Yes.

18 Q. Yes?

19 A. Yes.

20 Q. And I take it from your witness
21 statement that any of these non-sustainable sites would
22 be sites that you would classify from an ecological
23 point of view as being susceptible to the negative
24 effects of full-tree harvest in terms of site
25 productivity?

1 A. Yes. And also -- in some of those
2 cases there would be potential problems of erosion and
3 problems with natural regeneration.

4 Q. Okay.

5 Q. Now, I want to elicit your opinion on
6 a question and answer that I posed to MNR some time ago
7 with respect to full-tree harvest and I would like you
8 to have in front of you Volume 76 of the transcript,
9 page 12762.

10 MADAM CHAIR: Which page was that, Ms.
11 Seaborn?

12 MR. NEARY: 12762.

13 MADAM CHAIR: Thank you. 12762?

14 MS. SEABORN: Yes.

15 MS. SWENARCHUK: I don't believe you have
16 that transcript.

17 MS. SEABORN: Do you have that transcript
18 with you, Dr. Hutchinson, Volume 76.

19 THE WITNESS: I don't believe I do. I
20 have got 74 here.

21 ---Discussion off the record

22 MS. SEABORN: Thank you.

23 Q. Now, on page 12762 of the transcript,
24 Volume 76, I asked Mr. Armson some questions in
25 relation to full-tree harvest and, in particular, I

1 asked him about a statement that Mr. Greenwood had made
2 in his paper in Panel 10, and at the bottom of the page
3 the question:

4 "And Mr. Greenwood says that since the
5 potential for productivity loss in
6 Ontario is not considered significant
7 given current harvest practices and
8 rotations, measures to prevent or
9 minimize these potential effects do not
10 normally form part of operational
11 decision-making at this time; correct?"

12 Answer:

13 "Yes."

14 Question:

15 "And is that, in a nutshell, MNR's
16 position with respect to the use of
17 full-tree harvesting?"

18 Answer:

19 "I think that is a good general
20 statement, yes."

21 Now, based on your experience and the
22 evidence that you've presented to the Board, do you
23 agree, Dr. Hutchinson, that measures to prevent or
24 minimize the potential effects of full-tree harvest
25 should not normally form part of operational

1 decision-making at this time?

2 A. That's a sort of double negative;
3 isn't it?

4 Q. Yes.

5 A. Okay. I think they should form part
6 of management practices.

7 Q. Yes.

8 A. That we should be taking into account
9 potential for nutrient losses and creation of
10 non-sustainable harvests, and if that's not being done
11 at the moment, I think that should be rectified.

12 Q. Okay. And would you agree that if
13 maintaining site productivity is one's objective that
14 one should proceed operationally with caution prior to
15 full-tree harvesting a site?

16 A. Absolutely.

17 Q. Now, I understand from the responses
18 you gave to Mr. Cassidy today that there are no studies
19 available that have monitored the effects of full-tree
20 harvest through to the second generation; is that
21 correct?

22 A. That's my understanding.

23 Q. So we don't have --

24 A. I would be surprised. I don't know
25 of any.

1 Q. Okay. So if we're talking about a
2 rotation age of 65 years, we don't have a site in
3 Ontario that was full-tree harvested 65 years ago that
4 we can -- that we have test results on and study
5 results and we can see what's happening?

6 A. No.

7 Q. Today with that--

8 A. No, we don't.

9 Q. --with that second rotation?

10 A. No.

11 Q. Okay. And I take it it's your
12 position in relation to this topic that while there may
13 not be study results available, it's your advice, based
14 on your experience, that we should be cautious and we
15 should be cautious essentially in relation to what have
16 been termed these marginal or sensitive or
17 nutritionally poor sites?

18 A. Well, that would be the first place
19 to start. We should be very concerned about full-tree
20 harvesting, but I don't believe we should be doing
21 full-tree harvesting on nutritionally marginal sites.

22 Q. Right.

23 A. You know, the ability to look at the
24 effects of this are very limited at the moment, but
25 there's distinctly a large number of scientists,

1 including people who have worked in this province, who
2 have pointed out exactly the same things that I'm
3 saying, and that would include Timmer, Gordon,
4 Morrison, Mahendrappa, Maliondo and so on, the people I
5 have mentioned. So I'm not coming in and saying
6 something that hasn't been said by many people before.

7 Q. No, I understand that. I just want
8 to be clear in terms of the position on, that this is
9 your position.

10 A. Yes.

11 Q. Even in the face of a lack of studies
12 that have been done into the second rotation.

13 A. Yes.

14 Q. I just want to be clear on that.

15 A. And in places like Germany where
16 there has been a long history of management, then these
17 concerns have been expressed very clearly and, in fact,
18 I think Mr. Greenwood introduced one example which is
19 sort of slightly apocalyptic, but nevertheless makes
20 the point, and that was, that there was a concern in
21 Germany that spruce productivity in young plantations
22 was going down, and the investigation of that indicated
23 that because there was this practice of allowing litter
24 to be taken off sites, which has been a long-standing
25 practice in Germany, so I don't know, I think it was

1 described as a sort of the peasants were allowed to
2 remove the litter from the plantation or from the
3 forests.

4 And the feeling has been that as a
5 consequence of that litter being taken off site, which
6 is rather like taking the canopy off in full-tree
7 harvesting, there has been a fertility degradation of
8 those sites.

9 Q. And since we don't have studies
10 available that go into the second generation at this
11 time, then I take it there would not be scientific data
12 available then to point in the direction that full-tree
13 harvesting is not of concern on long-term site
14 productivity?

15 A. Correct.

16 Q. It goes both ways, is all I'm saying.

17 A. Correct.

18 Q. Okay.

19 A. The prudent thing surely to do is not
20 steam right ahead with full-tree harvesting and imagine
21 it can't happen here, when the evidence such as we have
22 is that there's a strong possibility that it can and
23 will happen here.

24 Q. Okay. Now, the Ministry of the
25 Environment in its terms and conditions of January,

1 1990 and in its redrafted terms and conditions dated
2 September 28th, has recommended that the Board impose a
3 term and condition to the effect that recommendations
4 contained in the Timmer, Savinsky and Marek report be
5 followed by foresters in the development of
6 silvicultural ground rules on a management unit level.

7 A. Right.

8 MS. SEABORN: And there's no need to go
9 to those, Madam Chair, but for your record, that is
10 Ministry of Environment term and condition No. 18(g)
11 which appears at page 7 of our September 28th redrafted
12 terms and conditions.

13 Q. Now, beginning at page 10 of your
14 witness statement, Dr. Hutchinson --

15 MADAM CHAIR: Excuse me, Ms. Seaborn,
16 should we take an afternoon break, or do you think you
17 are going to be finished soon?

18 MS. SEABORN: Yes. I'm going to be
19 finished fairly soon, but it could be a half hour. So
20 if the Board would prefer to take 10 minutes and come
21 back...

22 MADAM CHAIR: All right. We will take
23 our break now.

24 MS. SEABORN: Okay.

25 MADAM CHAIR: We will be back at three

1 o'clock.

2 MS. SEABORN: Three o'clock. Thank you.

3 ---Recess taken at 2:45 p.m.

4 ---On resuming at 3:15 p.m.

5 MADAM CHAIR: Please be seated.

6 MS. SEABORN: Q. Dr. Hutchinson, could
7 you please turn to page 10 of your witness statement,
8 Panel 1, and at the very bottom of the page you note
9 the recommendations that are contained in the Timmer,
10 Savinsky and Marek paper of 1982.

11 A. Yes.

12 Q. Now, in your opinion, should the
13 recommendations that you have reproduced in your
14 evidence be followed by foresters who are preparing
15 silvicultural ground rules?

16 A. These recommendations--

17 Q. Yes.

18 A. --from that paper?

19 Q. Yes.

20 A. Yes, I think they should.

21 Q. Okay. And as an ecologist are there
22 any other recommendations that you would propose be
23 followed in addition to the ones put forward by Timmer,
24 Savinsky and Marek?

25 A. Well, I have some concerns about the

1 size of shelterbouts.

2 Q. I'm sorry, the size of shelter...?

3 A. Shelterbouts. That's not mentioned
4 there. I guess if we stay with what they're talking
5 about, I think those are pretty good recommendations.
6 There may be a few practices which are not common now.

7 Q. Okay. Could you identify the
8 practices that would not be common now, based on your
9 experience?

10 A. Well, tree chipping of hardwoods I
11 think.

12 Q. I'm sorry, tree chipping of
13 hardwoods.

14 A. Tree chipping, yes.

15 Q. Okay. Anything else?

16 MADAM CHAIR: Excuse me, Dr. Hutchinson,
17 tree chipping for what purpose?

18 THE WITNESS: Well, it's an uncommon
19 practice. You mean, why did they used to chip trees?

20 MADAM CHAIR: Yes. We've heard various
21 evidence about chipping, but I wondered specifically
22 for what purpose the practices you're talking about.

23 THE WITNESS: Well, these are all things
24 which I -- just let me see the line where it says this.

25 MS. SEABORN: Q. Are you referring, if I

1 can assist, the top of page 11:

2 "Full-tree, complete tree chipping
3 operations be restricted to stands
4 supported by relatively deep mineral
5 soils."

6 A. Yes.

7 Q. And is your evidence then that tree
8 chipping operations are not common?

9 A. That's my understanding of it, yes.

10 Q. Okay. Now, is there anything else
11 that you would add to this list in terms of practices?

12 A. No, I am fully in support of
13 conventional logging on fragile shallow sites.

14 Q. No, I understand you're in support of
15 these recommendations based on what you said in the
16 next paragraph, I just want to be clear as to whether
17 there is anything that you would add to that list.

18 A. Well, the ones that FFT introduced as
19 its silvicultural procedures or prescriptions, yes.

20 Q. Okay. So the silvicultural --

21 A. Prescriptions from FFT I think,
22 where they're additional to -- I think they're not at
23 variance, but where they're additional to these,
24 obviously I would certainly recommend.

25 Q. And you're referring to the draft

1 terms and conditions that were filed early this week?

2 A. That's right.

3 Q. Okay, thank you. Now, Dr.

4 Hutchinson, I briefly canvassed the topic of full-tree
5 harvesting with Dr. Methven when he appeared on behalf
6 of the OFIA/OLMA during Panel 6 of the Industry's
7 evidence and I asked your counsel at the break to have
8 you review two pages of Volume 196 of the transcript,
9 in particular page 34698 to 34699.

10 Now, beginning on page 34698, line 16, I
11 asked Dr. Methven:

12 "I believe your testimony last week or I
13 guess the week before was that full-tree
14 harvesting can be carried out on any site
15 type; is that correct?

16 Dr. Methven:

17 "That is correct."

18 Question:

19 "What scientific evidence do you rely
20 upon to say that there's no problem with
21 full-tree harvesting on any site."

22 Now, Mr. Methven divided his response
23 into two parts, first within a strictly ecological
24 context; and, second, within a production context, and
25 - it's his view you had to separate the ecological

1 context and the production context and the response
2 appears on page 34699.

3 A. Mm-hmm.

4 Q. Now, would you first of all agree
5 that in order to answer the question that I posed you
6 should make a distinction between the ecological
7 context and the production context?

8 A. No, I don't think -- I mean, I
9 wouldn't personally make that distinction.

10 Q. Okay. Now, do you disagree in any
11 way with Dr. Methven's response?

12 A. Well, the first part says it should
13 be all right to do it because the amount of nutrients
14 carried in a full tree harvest; that is, it's about an
15 order of magnitude less than is plantated in the soil.
16 Well, some of the evidence that we have introduced in
17 this witness statement is at variance with that.

18 Q. Okay. And so that we don't go over a
19 lot of evidence that we have already heard, I take it
20 your position is that based on the evidence you have
21 presented to the Board you would disagree with Dr.
22 Methven's statement?

23 A. Yes.

24 Q. Okay. And what about the second part
25 of the response?

1 A. Sorry, can I just add a little bit to
2 the first one?

3 Q. Yes, sure.

4 A. And periodic regular disruptions in
5 the nutrient dynamics that are referred to here
6 presumably refer to fire, post-fire succession and
7 aspects of fire, and I don't think one can make a very
8 powerful argument that the amount of nutrients removed
9 in full-tree harvest are equivalent to or less than
10 what's left on site from fire, or the fact that
11 significant amount of the nutrients lost during a fire
12 comes down somewhere else in the boreal forest.

13 Now, the second one -- okay?

14 Q. Yes.

15 A. Well, if we're trying to manage -- if
16 we're trying to manage the boreal ecosystems in an
17 ecologically acceptable way, then I find difficulty in
18 having timber management which is at variance with the
19 ecological context, so I mean, we can look at this.

20 Well, this could also be rotational
21 cycles and things of that kind, so I'm really not in
22 agreement with that. And I'm not in agreement with:

23 "The rainfall dry deposition, the
24 weathering and ultimately the
25 re-establishment of nitrogen fixation.

1 will be adequate to compensate on
2 nutritionally poor sites from the losses
3 that you will inevitably sustain as a
4 result of full-tree harvest."

5 Indeed, this paper that Mr. Cassidy gave
6 us all earlier on by Carlisle and and Methven seems to
7 be strongly at variance with this.

8 Q. Okay. And that is Exhibit 1421, the
9 Environmental Consequences of Intensive Forestry and
10 the Removal of Whole Trees?

11 A. Yes. Yes, it is.

12 Q. And you said that this paper is at
13 variance with, Dr. Hutchinson -- or I'm sorry, Dr.
14 Methven's response to my question?

15 A. Yes.

16 Q. Okay. And in what way is it at
17 variance with Dr. Methven's evidence?

18 A. Well, he's expressing there --
19 Carlisle and Methven are expressing concerns both about
20 full-tree harvesting in terms of overall nutrient
21 removal and they're concerned even about -- well, do
22 you want me to read out various things that are at
23 variance with this to the Board?

24 Q. Sure.

25 A. Okay. Well, if you will bear with me

1 I will read to you and try and do it quickly.

2 This is on page 8 again which we referred
3 to this morning in discussion:

4 "The effect of harvesting on soil
5 fertility...", or,

6 "The effects of harvesting on
7 soil fertility..."

8 MR. FREIDIN: I'm sorry, where are we
9 reading from?

10 THE WITNESS: We're reading the
11 discussion.

12 MADAM CHAIR: Page 8 of Exhibit 1421.

13 THE WITNESS: Third paragraph which is
14 on -- the pages are not numbered, but if we count them
15 up we come to page 8.

16 MS. SEABORN: Q. And this is on the
17 left-hand side of the page?

18 A. Yes. Third paragraph down in the
19 discussion, starting with:

20 "The effects of harvesting on soil
21 fertility are not just a matter of
22 nutrient accounting. Repeated harvesting
23 of leaves and branches, on both short and
24 long rotations, removes from the forest
25 considerable amounts of carbohydrate

1 and protein, the organic matter upon
2 which the soil microorganisms (the
3 driving force of soil processes) depend.
4 We can only guess at the effects of
5 removing this organic matter from the
6 site, as studies of the carbon cycle in
7 the forest, and the role of the organic
8 matter in ecosystem dynamics are few and
9 far between.

10 If we demonstrate that there is a
11 nutrient deficit under a particular
12 harvesting system, we must ask ourselves
13 what this deficit really means in terms
14 of site productivity. We cannot yet
15 assess how large a deficit has to be to
16 cause concern, or what the time scale of
17 effects could be. The empirical approach
18 of assuming that all is well with the
19 forest if tree growth continues at
20 acceptable levels may not be reliable.
21 There could be a slow subtle change in
22 the biology, chemistry and physics of the
23 soil...", so here he's warning even if
24 things seem to be all right, they may not be.

25 "There could be slow subtle changes in

1 the biology, chemistry and physics of the
2 soil...", and I won't read the brackets,
3 "...that may not, at least for a time,
4 limit tree growth. When they do limit
5 tree growth the problems may be very
6 difficult to solve. It may also be
7 misleading to assume that because
8 harvesting leaves and small twigs only
9 removes a small proportion of the total
10 nutrient capital in the system is of no
11 importance. As Kimmins and Krumlik
12 (1976) point out, "A small capital of
13 rapidly circulating nutrients may sustain
14 a greater productivity than a large
15 capital of slowly circulating nutrients."
16 To remove such key components as leaves
17 and twigs with their relatively available
18 nutrients (except in certain acid
19 conditions where proteins are immobilized
20 by polyphenols), could have great effects
21 on productivity even though the
22 quantities involved are small."
23 Now, the quantities that we are talking
24 about in terms of the overall nutrient load in the tree
25 are not small, so they say here that, even if they are

1 small it still could be a significant problem. I don't
2 think I should read on and on, but the points are made
3 repeatedly here that -- and, in fact, at the very last
4 paragraph, maybe I will bore you with that:

5 "Monitoring soil fertility and nutrient
6 flux should be an integral part of all
7 intensive forestry systems, particularly
8 --", well, this is where short rotations
9 are involved, but suggesting that it should be an
10 integral part of all intensive forestry systems.

11 Q. Okay.

12 A. So that seems to me to be at variance
13 with the statements that you received in
14 cross-examination.

15 Now, this paper was 1979 so it's 11 years
16 later and people do have the right to change their
17 mind, but I would have expected had that the mind might
18 have been changed in a direction of more conservative
19 rather than more hopeful kind of way that seems to have
20 occurred.

21 Q. Okay. And, Dr. Hutchinson, would you
22 agree with Dr. Methven's and Carlisle's conclusion,
23 turning over the page, you see under conclusions, first
24 of all, Conclusion No. 4 says:

25 "Harvesting whole trees on long rotations

1 may or may not result in a nutrient
2 deficit depending upon the element and
3 the type of forest. It is impossible to
4 generalize."

5 A. Yes, I agree.

6 Q. Okay. And for Conclusion 6, would
7 you agree with the conclusion that states:

8 "It is impossible to generalize about the
9 effects of full-tree harvesting, since
10 impact is site and element specific.

11 Neither can simple conversions be made
12 from stem nutrient content to whole-tree
13 content; nutrient concentrations and
14 leaf/twig biomass are too variable.

15 However, a general statement can be made
16 to the effect that shortening rotations
17 greatly increases the risk of serious
18 nutrient depletion."

19 A. Yes, I certainly agree with that
20 latter component. I think it is possible to
21 generalize, so I'm not in total agreement with that
22 statement--

23 Q. Okay.

24 A. --well, the last part; however, the
25 general statement I am in agreement with.

1 Q. Okay. - So based on the testimony you
2 presented to the Board I think you've made it clear
3 that you feel there can be some general guidelines set
4 down with respect to full-tree harvesting?

5 A. Yes. As soon as you start
6 considering nutritionally poor sites and talking about
7 full-tree harvesting, then I think we are having a
8 major problem.

9 Q. Okay. Now, in terms of how we deal
10 with this problem, Dr. Hutchinson, you spoke in your
11 evidence of adding a nutrient dimension into the
12 existing forest ecosystem classification systems.

13 A. Yes.

14 Q. And I believe you said that through
15 the use of an improved FEC we would be able to get a
16 better handle on which sites -- I'm sorry, would you
17 agree with me that through the use of an improved FEC,
18 we would be able to get a better handle on which sites
19 fall into what has been termed this gray area of site
20 types?

21 A. Right, yes.

22 Q. Okay. So that would be one practical
23 solution for the Board in terms of how to deal with
24 this problem?

25 A. That's right. That would, I think,

1 lead us in the right direction.

2 Q. An operational...

3 A. It would be an operational system
4 that could be implemented I think.

5 Q. Okay. And this nutrient dimension is
6 not something that we have today; is it?

7 A. No, it's not a --

8 Q. It's not in operation in Ontario?

9 A. It's not.

10 Q. Okay. And given that it's not in
11 operation in Ontario, would you agree with me that
12 recommendations or guidelines for foresters, such as
13 the ones that we have referred to in the Timmer report,
14 are required until we can improve our ability to refine
15 site descriptions such that they take into account the
16 nutrient dimension?

17 A. Yes, I agree.

18 Q. Now, in your evidence on October 9th
19 you explained that, in your view, by measuring
20 silvicultural effectiveness at five years after harvest
21 one may not accurately pick up nutritional
22 deficiencies; is that correct?

23 A. Well, did I actually say --

24 Q. Well --

25 A. I agree with the statement. I'm

1 surprised I said exactly that.

2 Q. Okay. You may not have said exactly
3 that because I don't have a transcript from October
4 9th, I just have my notes, but so as not to misquote
5 you, I believe that the general tenure of your evidence
6 was that if we're looking at silvicultural
7 effectiveness and free to grow, which may be five
8 years, may be ten years, that at that stage one may not
9 pick up nutritional deficiencies; is that fair?

10 A. That's right, yes.

11 Q. Okay. And if it were suggested to
12 you that short-term site productivity could be enhanced
13 by full-tree harvest, based on assessment results at
14 free to grow, would you agree that that conclusion
15 would tell you nothing about the site's ability to
16 support future rotations?

17 A. Well, it might or might not, I think
18 you would have a big question mark over it in terms of
19 future rotations.

20 Q. Okay. And would you agree that if
21 there was -- after a full-tree harvest, if a site
22 showed an improved site productivity based on soil
23 samples or whatever studies the scientists did, that
24 wouldn't necessarily tell you that 60, 80, 120 years
25 from now that there would not be a problem?

1 A. No, the size of biomass which
2 sustains the size of the trees at that stage will be
3 quite small compared with the nutrient demands at later
4 stages.

5 Q. Okay. And I believe you recommended
6 that we should look at sites 15 to 20 years after
7 harvest or at the stage of canopy closure for conifers?

8 A. Yes.

9 Q. And would you agree with me, as a
10 general proposition, that in order to ensure site
11 productivity we need to not only do proper front-end
12 planning in terms of the prescriptions that we choose,
13 but we need to monitor selective sites to determine how
14 effective those prescriptions have been?

15 A. Absolutely, I think that is very
16 important.

17 Q. I want to deal briefly with the issue
18 of forest fertilization. Could you turn to Exhibit
19 1409 which is the Maliondo report and, in particular,
20 if you could turn to page 31.

21 A. This is the Maliondo and
22 Mahendrappa --

23 Q. Yes, the glossy covered document,
24 page 31.

25 A. Okay.

1 Q. Now, a couple of things about
2 fertilizers that Maliondo said and, in particular, he
3 explains at the bottom of page 31 that at least in the
4 Maritimes there is little experience of this practice
5 on an operational scale. Is that your understanding of
6 the situation in Ontario?

7 A. Yes, there's an operational scale, I
8 think there's little practical experience.

9 Q. Okay. Now, would you agree with me
10 that there are detrimental water quality effects
11 associated with the use of fertilizers?

12 A. They certainly have that potential.

13 Q. And if you could turn to the Ministry
14 of the Environment interrogatories, which is Exhibit
15 1424.

16 A. All right.

17 Q. Question 6, which starts at the
18 bottom of the second page, and we asked whether in Dr.
19 Hutchinson's opinion there are any adverse ecological
20 consequences of forest fertilization.

21 And the response was:

22 "While fertilization would have
23 beneficial effects on nutrient stocks on
24 harvested sites, it could cause
25 eutrophication of nearby lakes and rivers

1 if not applied with great care."

2 And would you agree with me that no
3 matter how careful someone is, there is a good chance
4 that some fertilizer is going to end up in a waterbody
5 if we used it on an operational scale in the boreal
6 forest?

7 A. Yes, especially if you use it in the
8 early stages.

9 Q. Meaning -- in the early stages,
10 meaning...?

11 A. I mean in the early stages of
12 re-establishment.

13 Q. Of the site?

14 A. Yes.

15 Q. Okay.

16 A. I mean, I haven't referred to
17 chemical forms and slow release forms and things of
18 that kind there, but obviously the formulation you
19 might be using would be important too to provide the
20 most effective way of fertilizing your forest, if that
21 is the primary purpose, and avoiding the problems of
22 waters.

23 Q. Okay. And would you agree that
24 extensive studies and research would be required prior
25 to implementing forest fertilization on an operational

1 scale in order to ensure that there were not adverse
2 effects on water quality?

3 A. Yes, yes.

4 Q. And would you agree that if
5 fertilizers were used, one of the results might be
6 increased competition on a site?

7 A. Yes, you might favour species which
8 you're not wanting to finish up with this year, so your
9 next crop --

10 Q. Right. And the greater the
11 competition the more likely the need there would be for
12 the application of herbicides?

13 A. If you did it in the early stages,
14 yes.

15 Q. Yes, okay. And are you aware that
16 FFT is seeking in its terms and conditions a ban on the
17 aerial application of herbicides?

18 A. No, I am not aware of that.

19 Q. Okay.

20 A. Perhaps I should be, but I'm not.

21 You can get your fertilizer incorporated into some
22 vegetation, even if it's a hardwood competitor, and you
23 can ultimately get release of that, then you will
24 finish up with that in your -- there's been a lot of
25 interesting work in Sweden on that.

1 The trick is to be able to switch it from
2 one plant form to another, and that's not easy.

3 Q. And you are aware; are you not, that
4 forest fertilization isn't part of the undertaking
5 that's in front of the Board?

6 A. Yes.

7 Q. There have been a number of
8 discussions throughout this hearing in relation to
9 comparisons between fire and clearcut, and there has
10 been evidence in relation to differences between fire
11 and clearcuts. I want to ask you, as a general
12 proposition, is it generally your position before the
13 Board that clearcutting does not mimic fire; is that
14 sort of your bottom line position?

15 A. Yes, that's right. That's right.

16 Q. Okay. So the premise that -- in
17 terms of presenting your testimony, the premise that
18 you are putting before the Board that in terms of a
19 renewal treatment is erroneous to say that clearcutting
20 emulates fire for the purpose of renewing our forests?

21 A. Right.

22 MADAM CHAIR: Hadn't you qualified that,
23 Dr. Hutchinson, by saying large clearcuts?

24 DR. HUTCHINSON: No, I would -- I think
25 the statement can be made that fire is not emulated by

1 clearcutting. And I mean, I could go and add on
2 various things on top of that.

3 One of the main things is it doesn't
4 create the seedbed which a fire does, it doesn't cause
5 the amount of destruction of shoots and so on which a
6 fire does; therefore, it leaves the possibility of
7 reshooting after fire and getting hardwood problems, as
8 well as seeding in of some hardwood species and so on.

9 So there's quite a lot of differences.
10 And then, I mean, then you go on to the size of fires
11 and we have been through this kind of, maybe ad
12 nauseum, about the size of fires and clearcuts.

13 MS. SEABORN: Q. Okay. I don't want to
14 get into the debate again at this point about the
15 hundred hectares that you canvassed with Mr. Cassidy.

16 Would you -- I take it though it's your
17 position that one cannot say that because we have large
18 fires in the boreal forest that that means that we can
19 have large clearcuts; you don't make that sort of
20 comparison?

21 A. It doesn't seem to me to be a logical
22 follow-up, that because some fires are very large,
23 therefore, clearcuts -- I don't know if anyone is
24 proposing this, but it would not be a logical
25 proposition to put forward that because some fires are

1 very large then we should have some clearcuts which are.
2 also very large. That doesn't follow in any sense.

3 Q. Okay. So if someone were putting
4 forward that proposition as being a rationale for large
5 clearcuts, you would disagree with that rationale?

6 A. I would, yes. Yes.

7 Q. Okay. And would you agree with me
8 that if you were trying to plan a clearcut that would
9 emulate fire, you would require man's intervention at
10 all stages of the planning process; you would require
11 man's intervention in terms of choosing the
12 prescription, implementing the prescription, and then
13 monitoring that prescription; would you agree with
14 that?

15 A. Yes.

16 Q. Okay. And in terms of man's
17 intervention, what we're looking at in terms of a
18 clearcut is a choice has to be made at some point as to
19 whether we are going to clearcut in such a way as to
20 promote natural regeneration, which involves a whole
21 series of choices, or clearcut and follow that clearcut
22 with artificial regeneration which involves a set of
23 different choices?

24 A. Yes.

25 Q. Is that fair?

1 A. Yes.

2 Q. Okay. And for both those choices,,
3 whether you go with artificial or natural regeneration,
4 man is going to have to intervene and there is going to
5 have to be some judgment exercised in terms of planning
6 that activity in terms of monitoring that activity and
7 in terms of reporting on that activity; is that fair?

8 A. Yes.

9 MS. SEABORN: Thank you, Dr. Hutchinson,
10 Mr. Martel, Madam Chair.

11 MADAM CHAIR: Thank you, Ms. Seaborn.

12 We're finished for the day. Thank you
13 very much, Dr. Hutchinson. We'll see you on Monday
14 morning. Thank you.

15 MR. FREIDIN: Before we adjourn --

16 MADAM CHAIR: Mr. Freidin?

17 MR. FREIDIN: Before we adjourn, I think
18 I have a number of documents to hand out and which the
19 witness should review for next week. We will get the
20 citations for these later, but the ones I'm going to
21 hand out are Chapter 1 from Odam, Fundamentals of
22 Ecology, paper by Paul Addison regarding acid
23 precipitation, an article by Mr. Lynham regarding fire
24 in the boreal forest.

25 MADAM CHAIR: Excuse me, Mr. Freidin, you

1 are going to be making these exhibits?

2 MR. FREIDIN: Yes. I'm going to make
3 copies of them. I'll hand these out and ask the witness
4 to review Panel 9, and the Foster and Morrison articles
5 that was part of those, Panel 10, Mr. Greenwood's
6 evidence, and the Foster, Morrison article 1979.

7 MS. SWENARCHUK: Excuse me. Panel 10,
8 Mr. Greenwood's evidence and Foster and Morrison...?

9 MR. FREIDIN: 1979 article which is
10 attached.

11 MS. SWENARCHUK: That's in the confines
12 of Panel 10?

13 MR. FREIDIN: Yes. He should bring along
14 the transcript which has been referred to in the
15 examinations to date.

16 MS. SWENARCHUK: All of them?

17 MR. FREIDIN: All of them.

18 MS. SWENARCHUK: Maybe you can --

19 MR. FREIDIN: No, no, the ones that you
20 brought, you said three, I haven't got the numbers.

21 MS. SWENARCHUK: All right.

22 MR. FREIDIN: Mr. Pascoe has them here.

23 MADAM CHAIR: I have two of them; one of
24 them is Volume 76 and one is Volume 196.

25 MR. FREIDIN: I'll advise the Board

1 tomorrow exactly which ones they are, tomorrow on the
2 phone.

3 MADAM CHAIR: Thank you.

4 MR. FREIDIN: I will advise Mr. Pascoe.
5 And I would ask you to bring your source books because
6 I will be asking you questions on almost all of the
7 articles in it. I just handed out copies of ones that
8 aren't already in the source book.

9 I expect to be at least a day, at least a
10 day.

11 MADAM CHAIR: Thank you, Mr. Freidin.
12 Are you preparing the witnesses for Panel 2 to come
13 next week?

14 MS. SWENARCHUK: Well, Mr. Lindgren can
15 speak to that.

16 MR. LINDGREN: Yes, we are, and we will
17 be ready to proceed on the Wednesday with our first lay
18 witness.

19 MADAM CHAIR: How much time are you going
20 to take in re-examination, Ms. Swenarchuk?

21 MS. SWENARCHUK: At this point I would
22 say not much. I can't think of more than a couple of
23 hours at the moment at the absolute most, perhaps
24 less.

25 MADAM CHAIR: So we could be finished

1 early on Tuesday?

2 MS. SWENARCHUK: We could be finished at
3 some point on Tuesday, yes.

4 MADAM CHAIR: All right. And so your
5 witnesses for Panel 2 would be here Wednesday morning?

6 MR. LINDGREN: That's correct.

7 MADAM CHAIR: Thank you.

8 ---Whereupon hearing adjourned at 3:50 p.m., to be
9 reconvened on Monday, October 15th, 1990, commencing
 at 10:00 a.m.

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